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10 May 1983

## USSR REPORT

## ENERGY

No. 146

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## COAL

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### USSR-MONGOLIAN COOPERATION IN COAL INDUSTRY

Moscow UGOL' in Russian No 11, Nov 82 pp 45-47

[Article by Engineer N. A. Ryzhayev (USSR Ministry of Coal Industry) and Candidates of Technical Sciences V. K. Yasnyy and Ye. M. Dubrovskiy (TsNIEIugol') (expansion not known)]

[Text] Comprehensive collaboration, fraternal mutual assistance and economic integration are very important factors determining the successful movement of the socialist countries along the path of scientific, technical and social progress.

Before the Mongolian People's Republic, which is a component part of the single world socialist system, stands the task of developing the national economy at accelerated rates. That requires concentration of forces, resources and means in its leading branches. Among such branches is above all the fuel and energy industry.

In 1982 the workers of the MNR are marking an important event in the history of the creation and strengthening of a socialist economy--the 60th anniversary of the fuel and energy industry. In December 1922 the government of the young republic nationalized the "Nalaykha" coal mine, the only one existing in the country then, which had an annual output of a total of 800 tons. Coal was of great importance for the successful advance of the national economy from the first years of people's power. Thanks to planned efforts and the overtaking rates of development of the fuel and energy base at the present time a modern coal industry has been created in the MNR.

The total geological reserves of coal in the MNR are estimated to be 17 billion tons, including 13.6 billion tons of bituminous coal, about 53 percent of which is suitable for coking.

The MNR belongs among the countries which are capable of satisfying internal needs for power-producing and coking coals through its own resources. Coal mining is increasing at high rates. In 1971-1975 the annual average rates of increase amounted to 6.4 percent, and in 1976-1980 to 10 percent. On the whole in the last 25 years the volume of output has increased from 0.5 to 4.3 million tons. In 1981 about 85 percent of the total volume of electric power was produced with solid fuel. In coal output per capita the MNR has emerged on the level of the USSR and other countries of socialist collaboration.

The open-pit method of extraction has obtained preferential application in the MNR. Its proportion in the total volume of mining is about 80 percent. In 1981 more than 3.4 million tons of coal were extracted by that method. Almost 51 percent of the coal is produced by the "Sharyngol'skiy" section, the largest.

In addition, coal mining is done by the underground method, the main volume of which is provided by the modern highly mechanized "Nalaykha-Kapital'naya" mine. The proportion of coal mining from complexly mechanized longwalls amounts to 97 percent, and the level of conducting development workings with mechanized loading of coal and rock is 98.1 percent.

In connection with the growth of industry and the development of agriculture, in the next 10-15 years the need for fuel and energy reserves in the country will increase by more than 10 times in comparison with 1970. For many years coal will serve as the main fuel and energy balance of the MNR, and its share will grow from 74.6 percent in 1980 to 84 percent in 1985 and 89 percent in 1990.

The successes attained by the coal industry of the MNR were a result of close collaboration with CEMA member-countries on the basis of complex programs of development and improvement of the branch. A considerable place in that work is occupied by direct contacts between the coal industry of the USSR and the MNR.

The disinterested help of the Soviet Union has a comprehensive character and embraces the surveying of deposits, the planning and construction of enterprises, the mining and processing of coal, the provision of enterprises with modern technology, the conducting of scientific research work and the working out of prospects of development. The collaboration between the USSR and the MNR is accomplished on a long-range planned basis and is developed and strengthened with each year.

The main volume of planning work for the coal industry of the MNR is accomplished by organizations of the USSR Ministry of Coal Industry. The technical plans of coal-mining enterprises have been developed by Giproshakht and Kuzbassgiproshakht. The plans envisage the application of modern mine-extracting and mine-transport technology with the provision of advanced labor organization. Giproshakht proceeded to develop a technical plan for the second line of the "Baganurskiy" section, the annual capacity of which must be brought to 6 million tons of coal. In the plans very progressive decisions are adopted which assure the introduction into operation of modern highly mechanized powerful enterprises using the latest achievements of mining science and technology.

In the years of recent five-year plans large volumes of work have been done on the creation of fuel and energy complexes which are contributing to the development of new industrial centers.

Thus, in 1965 with the collaboration of the Soviet Union, the "Sharyngol'skiy" section was constructed, with a capacity of 1.1 million tons of coal a year, and also a thermal electric central line and a large industrial center in the region of the city of Darkhan. On the basis of the "Alun-Chulun" section a thermal electric central line has been constructed, and a new industrial center created in the eastern part of the country at Choybalsan.

At the present time, with the participation of the USSR Ministry of Coal Industry, the "Sharyngol'skiy" and "Alun-Chulun" sections and also the "Nalaykha-Kapital'naya" mine are being reconstructed. The "Baganur" section is being constructed and in 1982 produced its first coal. The introduction of this large section and a large electric power station on the base of the Bagandur deposit of lignite into operation will permit creating a new fuel and energy complex in the Tsentral'nyy Economic Rayon of the country, which will assure satisfaction of the rapidly growing needs of the national economy of the MNR for fuel and electric power.

The main directions of collaboration in the area of exploitation of coal enterprises are the organization of productive capacities, the application of advanced Soviet experience: on sections--the achievement of high loads per unit of mine-extraction and mine-transport equipment; in mines--the assurance of average daily extraction in a mechanized longwall of over 1000 tons of coal; in all the main processes of coal extraction--the application of the brigade form of labor organization; in scientific research--the extending of aid to the Scientific Research and Planning Institute of the Fuel and Energy Industry in the development of plans and the performance of scientific research work.

The enterprises are equipped with modern highly productive equipment of Soviet origin. Thus the new stage of technical re-equipment of open mining work is characterized by a transition to the use of equipment of large unit capacity. During 1975-1979 were excavators EKG-4U, EKG-8i and ESh-10/70 organized. The "Baganurskiy" section is being equipped with modern equipment; at it progressive technology will be applied, with use of draglines ESh-10/70 and ESh-15/90.

Transport on the sections also is being developed in the direction of increase of the unit capacity of means of traction and the loading capacity of dumpcars and motor vehicles. Whereas in the years of the 5th and 6th five-year plans the dump truck pool on large sections amounted basically to the models KrAZ-256 and BelAZ-540 with a load capacity of 12 and 27 tons, in the 7th Five-Year Plan coal cars BelAZ-7525 with a load capacity of 40 tons will be organized. On the "Baganurskiy" section OPE-1A traction units with a coupling weight of 240 tons and dumpcars VS-145 with a load capacity of 145 tons will be used, which will assure a reduction of 32 percent on expenses for transporting mine mass in comparison with the used TEM-2 diesel engines and VS-60 dumpcars.

Almost 96 percent of the entire volume of drilling is done by rotary and roller-bit drills SBR-125, SVB-2M and 2SBSH-200N. The transition in the future on the "Baganurskiy" section to a new, more improved type of rotary drill (SBR-160) will permit increasing labor productivity and completely eliminate manual operations in drilling work.

Necessary attention is being given also to the mechanization of labor-intensive auxiliary processes, above all to drilling and blasting work, by the introduction of charging machines MZ-3 and SUZN-5A for the mechanized charging of drillholes and ZS-1B machines for their tamping.

On underground mining work in the MNR modern mining technology also is used. At the "Nalaykha" mine mechanized OKP complexes are in operation. Tunneling combines PK-3 and PK-3R are used on development works. Electric locomotive haulage is being mainly replaced by conveyer transport.

Thanks to the application of modern technology for complex mechanization of extraction of minerals and development work, the automation of transport and a number of auxiliary processes in mines, high technical indicators have been successfully achieved. Thus, the mean monthly labor productivity of a worker is 67.8 tons and the mean daily load on a face exceeds 1000 tons. The rate of development workings is 300/380 meters/month. In 1979 a record of conducting seam workings, 64.8 m/day, was made at the mine in 1979.

The development of coal mining by the open-pit method has led to considerable improvement of the technical and economic indicators of the work of the branch as a whole. In the last 10 years labor productivity per worker has become 2.4 times as large, achieving in 1980 for the branch 116 tons/month, with a reduction of cost of mining a ton of coal by 15 percent.

A very important component of the collaboration between the USSR Ministry of Coal Industry and the MNR Ministry of Fuel and Energy Industry is joint work of the branch institutes, the transmission of scientific and technical information to the Mongolian side, the sending of Soviet specialists to the MNR to develop recommendations on improvement of technological processes and work of separate coal enterprises, and the instruction of Mongolian miners in courses of higher instructions of the USSR Ministry of Coal Industry.

Scientific and technical collaboration between the NIPITEP MTEP of the MNR and scientific and planning organizations of the USSR Ministry of Coal Industry embraces very important problems of great importance for the successful development of the coal industry of the MNR.

Among the most important developments of the past five-year plan one can mention the joint development by TsNIEIugol' and NIPITEP of a general scheme of development of the coal industry of the MNR to 1990. The goal of the work was to prepare an optimum scheme of development of the branch, one permitting achievement of the best technical and economic indicators. The results of the work were used by the MTEP and MNR Gosplan in planning the development of the coal industry and the preparation of a general scheme for the development and distribution of the national economy of the MNR to the year 1990.

Improvement of the technology and complex mechanization of the processes of coal extraction by the open-pit method in the MNR consisted in the preparation of standard technological plans for the selection of rational parameters of systems of exploitation, the types and combinations of loading and transport equipment for overburden and mining work. The Mining Institute imena A. A. Skochinskiy and the NIPITEP developed an algorithm for optimizing the parameters of coal sections by the criterion of the minimum of expenses incurred, with the use of which optimization calculations were made for the "Baganur" section. The results of the calculations were used by Giproshtakht in planning a section for substantiation of the technical and economic indicators of the work and the dimensions of the field of the section, and selection of a technological scheme for overburden and mining work and the type of mine-transport equipment. The algorithm is used at present for optimization calculations for other promising deposits and operating sections of the MNR. "Standard scheme of technological complex for sorting and loading coal," created by the Giproshtakht and NIPITEP with reference to conditions of sections of local importance, is used in preparing a plan of a complex for sorting coal and briquetting coal fines on sections of the MNR.

The IOTT [expansion unknown] and the Mining Institute have extended and are extending much help in conducting research of coals of the MNR. Thus, analyses have been made and the qualitative characteristics have been determined of core samples for the Uvdug-Khudug deposit, and the briquetability has also been investigated for coals of the Uvdug-Khudug and Adunchulun deposits. Samples of coals of the Bayanteg and Baganur deposits have been investigated to determine the effectiveness of obtaining liquid fuel from them. All this contributes to the selection of directions of complex use of coals in the national economy of the MNR.



Co-workers of the VNIUgol' and Mongolian specialists have prepared a technical plan to improve the administration of the coal industry of the MNR, which is the main variant of further modernization of the structure of administration of the branch.

Thus the collaboration between scientific-research and planning organizations of the USSR and the MNR will contribute greatly not only to growth of efficient production but also to increase of the qualifications of scientific workers and planners in the MNR, who at the same time obtain information about advanced achievements of mining science on specific themes.

An important place in the collaboration between miners of the USSR and the MNR is occupied by exchange of advanced experience of mines and sections. To extend technological collaboration in the mastering of planning indicators and the further development of coal-mining enterprises, the Soviet Union will send to the MNR on a mission for considerable periods highly qualified engineering and technical workers and other workers who jointly with Mongolian specialists prepare measures to improve the work of separate enterprises of the coal industry and also transmit their experience in work directly at the work places.

During collaboration of Soviet specialists in all the main links of production--in breakage and development faces, in the crews of excavators, locomotive personnel and the like--daily brigade organization of labor is used, which contributes to the growth of labor productivity and the preparation of qualified national cadres. In 1981 alone over 150 workers were prepared by Soviet specialists in the educational network at coal-mining enterprises.

The Soviet Union extends collaboration to the MNR in the organization of a scientific and technical information service. Within the framework of the international branch system of scientific and technical information of CEMA member countries the MNR is represented as a separate national organ which collaborates with all the socialist countries, including the USSR's separate national organ (VNO). The functions of the MNR VNO in the "Inforugol'" system are performed by the branch center of scientific and technical information under the NIPITEP. The annual growth of its information fund along the line of collaboration amounts to about 15,000 units.

The TsNIEIugol' sends the MNR VNO examples of buildings of the institute, sends methodical documents on the organization of the branch organ of scientific and technical information and extends collaboration in the preparation of scientific and technical documentation. In addition, specialists of the branch information center of the MNR are stationed at the TsNIEIugol' and the International Center of Scientific and Technical Information to study the organization of functioning of the branch in the international system of scientific and technical information.

The technical collaboration of the USSR and the MNR in the area of the coal industry has given positive results: the task of providing the national economy of the MNR with fuel has been solved, in connection with which the export of coal from the USSR to the MNR was discontinued in 1981.

Coal mining in the country, in comparison with the 1975 level, will be 2.7 and 4.3 times as large in 1985 and 1990 respectively. The average annual rates of increase will be about 10.3 percent. The coal output in 1985 will increase to 7 million tons, in 1990 to 11.8 million tons. The development of the yield will be accomplished mainly by the open-pit method.

The Soviet Union will extend to the MNR active collaboration in the development of the coal industry in two main directions. The first is the construction and reconstruction of powerful mechanized coal-mining enterprises with highly productive equipment and high labor productivity, such as the "Baganurskiy" section, the capacity of which upon completion of construction will reach 6 million tons per year, the Sharyngol'skiy" section with an annual productivity after reconstruction of 2.5 million tons and the "Nalaykha-Kapital'naya" mine--1 million tons. Those enterprises constitute the basis of the fuel and energy industry of the country. The second is the creation and reconstruction of small sections, located in most aymakhs of the country. They supply with fuel dispersed consumers, especially the rural population. Joint investigations are to be made on an effective method of caking coals (primarily thermal briqueting).

An important condition for the fulfillment of the designated tasks is further expansion of collaboration of Soviet and Mongolian specialists, which in the 1980's will be accomplished in accordance with a program for expansion and deepening of collaboration between the USSR Ministry of Coal Industry and the MNR Ministry of the Fuel and Energy Industry in the period until 1990. In that program much attention is given to bringing close the procedures and normative basis of planning, bringing close methods of discovery and use of internal production reserves in the coal industry, the arranging of exchange of experience between individual enterprises, etc. The complex of scientific and technical problems will be expanded, on which collaboration of the USSR Ministry of Coal Industry and the MNR MTEP is being accomplished in 1981-1985. A distinctive feature of such collaboration will be a transition from themes of a general technical and economic plan to the solution of specific questions of improvement of the technique and technology of coal mining and processing in the MNR.

Collaboration between Mongolian and Soviet miners, the basis of which is complete mutual understanding, comradely mutual assistance, is a reliable guarantee of the further rapid development of the coal industry and strengthening of the fuel and energy base of the MNR.

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## COAL

### COAL INDUSTRY COLLECTIVES ANNOUNCE SOCIALIST PLEDGES FOR 1983

Moscow UGOL' in Russian No 3, Mar 83 pp 3-4

[Article: "Socialist Pledges of the Collectives of Production Associations, Enterprises, Construction Projects and Organizations of the USSR Ministry of Coal Industry for 1983"]

[Excerpt] In response to the fatherly concern for miners displayed by the party and government, coal industry workers adopted the following socialist pledges for 1983.

Complete the 1983 coal mining plan ahead of schedule, on 30 December, and extract 2.5 million tons of coal in excess of the plan. Raise the volume of coal mining using the more economical open pit method to 290 million tons, to include 128 million tons mined with rotary excavators; extract 278.5 million tons from fully mechanized stopes, and tunnel 2,180 km of mine drifts using combines at existing coal and shale mines.

Produce 0.5 million tons of high quality concentrate in excess of the plan, including 0.3 million tons for coking purposes, reduce the ash content of coal shipped to consumers by 0.1 percent, insure that not less than 26 percent of the total volume of coal machine building products earn the State Seal of Quality, and earn the latter for 11 new articles.

Surpass the quota for the labor productivity growth rate by 5 percent. Insure unconditional fulfillment and overfulfillment of planned quotas for introducing advanced skills, and increase the number of brigades (sections) achieving a stope load of not less than 1,000 tons per day to 500, the number of high-speed tunneling brigades to 600, the number of highly productive excavator and transport brigades to 900, the number of brigades completing an annual volume of construction and installation jobs totaling 500,000 rubles and more to 385, including 90 brigades achieving a volume of 1 million rubles. Complete 286 million rubles worth of construction and installation jobs by the brigade contract method. By reducing the cost and improving the quality of mined coal, decrease planned losses by 5 million rubles.

Achieve a 190 million ruble savings by introducing inventions and efficiency proposals, to include a savings of 26.5 million rubles from introducing inventions.



Broadly utilizing the work experience of the leading collectives, save 350 million kw·hr of electric power and 50,000 tons of relative fuel units.

Raise the effectiveness of capital investments and insure introduction of productive capacities capable of producing 14.7 million tons of coal, and place major coal enterprises into operation: the "Medvezheyarskaya" mine in the Ukraine with an output capacity of 1.2 million tons, the Achinsk section of the "Nazarovskiy" open pit with a capacity of 3 million tons, and the next generation of the "Neryungrinskiy" open pit with a capacity of 4 million tons of coking coal.

Surpass the standard net production plan by 1.1 million rubles at coal machine building plants. Introduce 192 high-productivity specialized and banked machine tools, 52 machine tools equipped with programmed control, and 24 automatic and semiautomatic welding units; manufacture 12 ready-to-install series of mining equipment and 21 experimental articles.

Attaching important significance to accelerated implementation of the Food Program, the laborers of subsidiary farms and sovkhozes servicing coal industry will produce 65,000 tons of potatoes, 87,000 tons of vegetables (including 16,000 tons from hothouses), 77,000 tons of milk, 21,000 tons of meat, including 5,500 tons from the fattening bases of industrial enterprises and 89 million eggs for the sector's laborers, and they will supply 114,000 tons of forage grain for the needs of animal husbandry. They will achieve these figures by improving farming practices, raising the quality of agricultural operations, reinforcing the feed base and raising the productivity of animal husbandry.

Improve environmental conservation and return 30,000 hectares of recultivated land to land users.

Insure construction of residential buildings with a total area of 1,903,000 m<sup>2</sup>, to include 143,000 m<sup>2</sup> on a self-help basis, preschool children's institutions with a capacity of 3,000 children, schools for 600 students, a hospital with a capacity of 240 beds, a vocational-technical school with a capacity of 6,070, stores with an area of 1,540 m<sup>2</sup>, a 600 bed capacity sanatorium-dispensary and a vegetable storehouse with a capacity of 11,100 tons with the purposes of fulfilling the sector's social development plans and raising the standard of living of the laborers. Support construction of private homes with a total area of 40,000 m<sup>2</sup> through advantageous bank loans.

Surpass the plan for producing consumer goods and household articles by 100,000 rubles.

Improve health protection for laborers and their families, provide passes to sanatoriums, health resorts, vacation homes and bases and tourist bases to not less than 240,000 persons, and passes to Pioneer camps, labor and vacation camps and children's bases to not less than 320,000 children..

Organize delivery of hot food to workplaces to the workers of not less than 465,000 mines and open pits.

Provide training in economics to not less than 700,000 persons, upgrade the qualifications of 290,000 laborers and white collar workers, and train 200,000 new workers, to include 44,000 in vocational-technical schools. Raise the general education level of not less than 56,000 young workers in night schools and in other educational institutions.

Insure further improvement of the working conditions and labor safety at the sector's enterprises and construction projects.

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## COAL

### MOSCOW COAL CONFERENCE REVEALS DEFICIENCIES, SUGGESTS REMEDIES

Moscow UGOL' in Russian No 3, Mar 83 pp 6-7

[Article: "Another Boost for the Movement of the Thousandsers!"]

[Excerpts] A conference of the leaders of mining, tunneling and excavating brigades and sections and workers of transport, machine-building plants and concentration factories was held in Moscow in January 1983.

Speaking at the conference, Minister of Coal Industry B. F. Bratchenko dwelled on the work results of the sector for 1982, and he stated the tasks facing the miners in light of the decisions of the November (1982) CPSU Central Committee Plenum and the premises and conclusions spelled out in a speech given at this plenum by CPSU Central Committee General Secretary Comrade Yu. V. Andropov.

However, there are still significant shortcomings in development of the movement of the "thousanders." Executives of certain enterprises and associations are still not devoting enough attention to providing the high-productivity collectives with everything they need to achieve the highest goals. Thus in 1982 the plans called for 477 brigades working at the 1,000 unit level, while in fact there were only 441.

This situation came into being because there were delays in preparing the mineral extraction front, because equipment and manpower were not used efficiently and because equipment was not supplied on schedule. This is particularly true of mechanized complexes, which did not arrive on time in a number of cases, as a consequence of which the brigades suffered interruptions in their work.

An effort must be made to study and introduce the experience of the leading collectives into all mining, tunneling and transport brigades.

B. F. Bratchenko pointed out the fact that deliveries of metallic props to the mines have been increasing with every year, and that the proportion of mine working reinforced with metal is 67 percent. The average cross section of workings adjacent to longwalls is growing. It will be increased to 12 m<sup>2</sup> by the end of the five-year plan. This process must be accelerated, since an insufficient cross section prevents sensible development of communication and transportation systems and power and auxiliary support.

Special attention should be turned to organizing equipment repair. Today about 30 percent of the stopes are working without a special shift reserved for repairs. As a consequence the mining complexes have suffered periods of idleness representing about a third of the total work time.

The equipment repair schedules must be complied with strictly. Equipment must be brought to the surface and surrendered for repairs at the established times.

The quota for the number of high-productivity excavator brigades and the number of such brigades at open pits was not reached. As a result the work volume fell short of the plan by about 3 million m<sup>3</sup> of overburden and 150,000 tons of coal.

A most progressive method of organizing production--the brigade contract--is still being introduced too slowly into construction. The "Soyuzshakhtostroy" and "SoyuzstroyTEK" associations fell short of their quota for the number of brigades completing construction and installation jobs worth 500,000 rubles and more per year. Little attention is being devoted to developing brigade labor organizations at plants of the Soyuzuglemash. It is important today not only to convert as many brigades as possible to the brigade contract and to introduce it into coal mining and extraction operations at the mines, into transportation and into coal machine building, but also to organize the effort in such a way that the brigades would be created thoughtfully, so that each of them would be a friendly cohesive collective headed by an efficient, resourceful leader.

The main thing today is to create conditions for highly productive labor for the collectives; it is only in this way that the brigade form of labor organization can be the most effective.

In 1983 coal industry workers were given the task of extracting 716 million tons of coal, which is 6 million tons more than in 1982. In the third year of the 11th Five-Year Plan the number of collectives mining 1,000 units must be increased to 500, the number of high-speed tunneling brigades must be increased to 600, the number of high-productivity excavating and transport brigades must be raised to 893, and the number of construction brigades completing construction and installation jobs worth 500,000 rubles and more per year must be increased to 385.

This will require creation and sensible use of working faces and mining equipment, fulfillment of the 1983 quotas for preparatory operations at mines and for stripping operations at open pits, and introduction of new working faces, horizons and coal mining capacities.

In the area of capital construction, attention must be focused on construction projects already under way. The task of machine building is to increase production of mining equipment, raise its quality, reliability and life, and provide a sufficient quantity of spare parts.

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## COAL

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### EKIBASTUZ COAL MINE DEVELOPMENTS

Moscow UGOL' in Russian No 11, Nov 82 pp 17-20

[Article by Academician V. V. Rzhnevskiy]

[Text] In accordance with decisions of the 26th CPSU Congress, in the Eastern rayons of the country, on the basis of coal deposits favorable for the development of open mine workings, a number of enterprises of especially large capacity ought to be created. The construction of such enterprises is contemplated in the Ekibastuz, Southern Yakutsk and Kansk-Achinsk basins. Since the creation, organization of the capacity and operation of these enterprises will be accomplished in the course of several decades, it is very important even now to adopt principal solutions which would assure progress of economic indicators and permit avoiding in the future complications which could have a negative effect on the development of the power engineering of the country.

Examined in the present article are some problems in exploiting the Ekibastuz deposit. That deposit consists of an asymmetric, mold-shaped fold with a length of about 14 kilometers and a width of over 7 kilometers (Figure 1). The thickness of the rocks of the overburden in the center of the mold is 550 meters. Seams 1, 2 and 3, with a thickness of 21.6, 34.5 and 72.1 meters respectively, with different angles of bedding, are being exploited. The total thickness of the coal-bearing suite is 150 meters. The depth of bedding of seam 3 reaches 680 meters. The mean coefficient of the underburden over the deposit is  $2.4 \text{ m}^3/\text{ton}$  at a selective removal of about  $2.1 \text{ m}^3/\text{ton}$  and a total removal of 3 for the seam. The seams are of complex structure with the inclusion of a considerable number of rock interlayers. The technical ash content of seam 3 is in the range of 44.5-47.3 percent and the reserves are about 60% of all the reserves of the deposit.

The relatively readily exploitable stripping and the presence of areas for the disposition of banks fairly close to the beds, in spite of the considerable final depth, favor the application of the open method of exploitation. Up to the present time mining work has been done mainly on the outcrop of the seam, where the stripping coefficient was  $1-1.3 \text{ m}^3/\text{ton}$ . The thicknesses contemplated by the plan for the coal outcrop can be assured thanks to plot of near-surface sections with a low coefficient of stripping at a considerable length of the front of mining work (Fig 2a).

In subsequent years with deepening work with the adopted working procedure the length of the front of mining benching will be reduced (Fig 2b), in connection with which considerable difficulties arise in assuring stability of thicknesses of layers. To

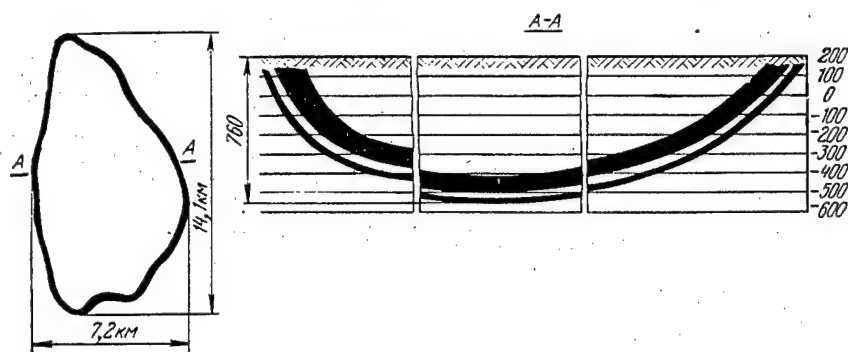


Fig 1. Plan of seam outcrops of the Ekibastuz deposit.

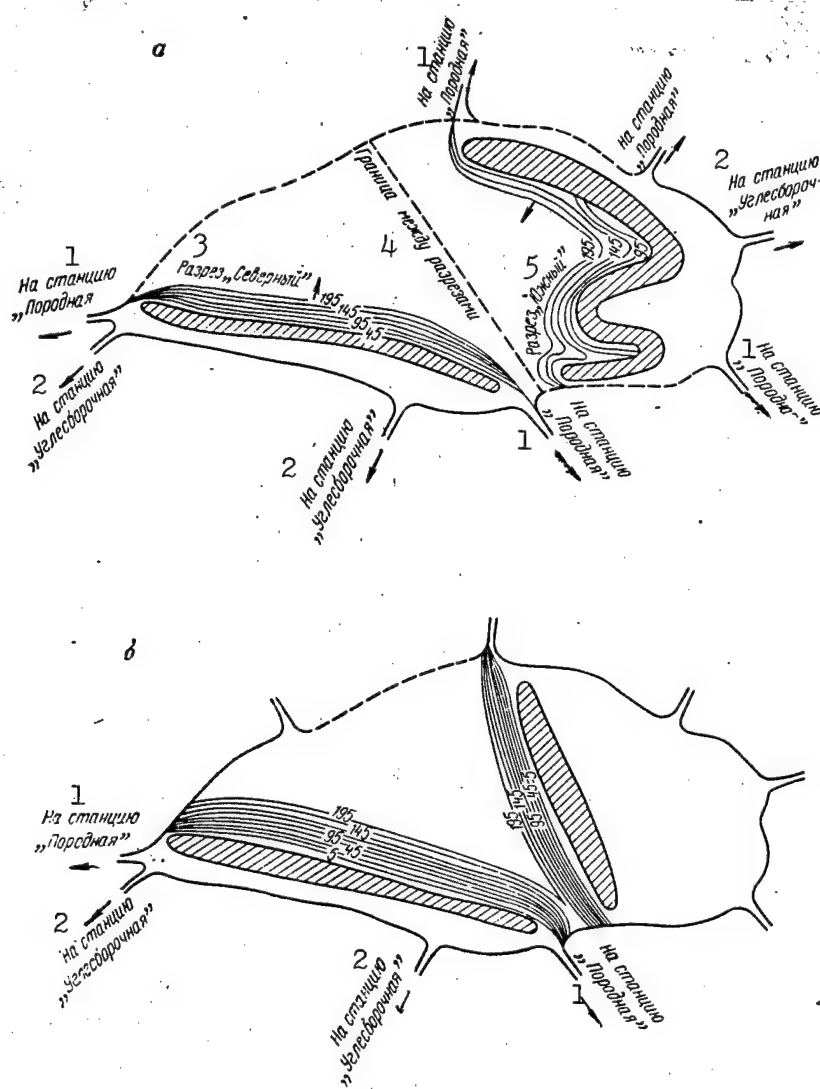


Fig 2. Dimensions of the front of mining work in exploitation of the Ekibastuz deposit.

a -- during complete development of mining work on stations near the surface  
b -- during exploitation of deep horizons

- 1- To "Porodnaya" station
- 2- To "Uglesborochnaya" station
- 3- "Severnyy" section
- 4- Boundary between sections
- 5- "Yuzhnyy" section

assure a total thickness of future "Severnnyy" and "Yuzhnyy" sections of 150 million tons a year when mining work is deepened it will be necessary to move very large volumes of the overburden rocks. When the sections are deepened toward the start of "phasing-out" of volumes of overburden work (the moment of encounter of the overburden front of the "Yuzhnyy" and "Severnnyy" sections at the surface) the coefficient of external overburden rises at first to 2.5 and then to 3 m<sup>3</sup>/ton.

The annual volumes of displacement of overburden rocks by deposit by 1990 will reach 176 million m<sup>3</sup>, by 2000 will be about 220-230 million m<sup>3</sup>, and by 2010 it will amount to 300-320 million m<sup>3</sup>, including 130-140 million m<sup>3</sup> for the "Severnnyy" and 170-180 million m<sup>3</sup> for the "Yuzhnyy" sections (Fig 3). Then will start a period of "phasing-out" of the volumes of overburden work and a sharp increase of the coefficient of overburden and the volumes of exploited rock mass. The total volume of exploited rock mass (with consideration of coal) in the "peak" period for the deposit will be about 400-420 million m<sup>3</sup> a year, or about 2.5 million tons a day.

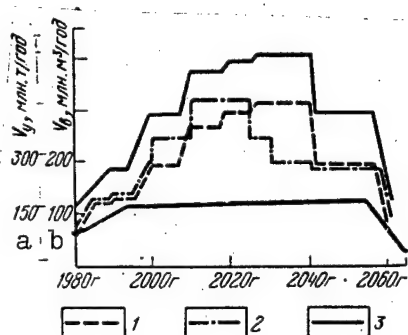


Fig 3. Variation of volume of coal mining  $V_y$  and volume of work on overburden rocks  $V_B$  by years

- 1 - volume of overburden work according to calculations of Moscow Mining Institute (MGI);
- 2 - volume of overburden work according to calculations of Karagandigiproshtakht;
- 3 - volume of exploited rock mass according to calculations of MGI;

a -  $V_y$ , million tons/year

b -  $V_B$ , million tons/year

The overburden coefficient is being increased at especially rapid rates on the "Severnnyy" section, where at the present time the depth of exploitation has reached 180 meters. In 10-15 years the overburden coefficient on that section will be 2.5-3 m<sup>3</sup>/ton, and the complexity of exploitation will rise sharply due to increase of the depth and reduction of the front of mining work.

The conditions of mining work on sections of Ekibastuz can be somewhat improved on the whole by changing the order of exploitation of deposits in comparison with that adopted in the planning developments. Change of the overburden plan will include about 1 billion m<sup>3</sup> of overburden rocks to be taken in earlier periods. However, even in that case the assuring of a stable level of gross removal of coal of 150 million tons per year in 1995-1997 will be possible only if the level of overburden work is brought to 150 million m<sup>3</sup> by 1992, 200 million m<sup>3</sup> by 2000 and 300 million m<sup>3</sup> per year in the course of 3 decades (see Fig 3). In subsequent years the volume of overburden work will be reduced to 100 million m<sup>3</sup> per year.

The great length of the front of work in the initial years of exploitation and the limited number of transport events (colliery freight traffic) were the reasons that

even now on Ekibastuz sections, under very favorable conditions of exploitation, powerful railroad excavator complexes have low productivity. On the front of benching, where a single excavator might work, two are working, additional sidings and movable railroad lines are being laid.

With deepening of the mining work and complication of the route (simple siding routes are replaced by complex ones with multiple change of direction of movement) the mean distance of transport of mining rocks on the "Severnnyy" section according to the reconstruction plan will reach 16 kilometers, that is, will almost double in comparison with the 1980 level; the distance transported on the surface will also increase as a result of further development of outer terraces. The plans for reconstruction of the "Severnnyy" section and construction of the "Vostochnyy" section envisage only partial solution of the listed problems: it is planned to further introduce powerful overburden and mining excavators, heavy-load trains with a useful mass of 1200-1300 tons, to create stationary internal trenches, to use conveyers and to construct a blending complex. However, the solution of the main problem--distribution of the load flows of overburden rocks and coal in the indicated volumes--is not assured by the system of overburden workings in all stages of exploitation. Therefore the quarry rail transport, in spite of increase of the capacity of means of traction and the useful mass of trains, will be used under increasingly difficult conditions and will not give the expected effect on productivity and the economic indicators. Down-time of powerful excavators in the expectation of empty cars with the adopted transport plans will be considerable as before.

Analysis of transport traffic and its variations in time proved that use of railroad shipments can be highly efficient when the following obligatory conditions are fulfilled.

1. The efficient use of mining and transport equipment is possible if there is effective and rapid exchange of trains at the faces. That can be achieved during continuous movement of trains, their short running on horizontal lines, the absence or a minimum number of switches, and also of variation of the direction of motion of trains over strippings, workings and on the surface. Those conditions can be met if not less than 10 permanent trenches are created along the mold perimeter, each of which opens up to direct trains without variation of direction of motion of the trains a definite group of terraces (Fig 4).

2. In different stages of the development of mining work, during advance of overburden and mining work and variation of the volumes of the exploited rock mass, the traffic of overburden rocks and coal linked to each working vary sharply by years of operation of the sections. The freight flows of coal and overburden rocks also vary with time on stations and the intensity of work of separate terraces. For example, if 10 permanent trenches are taken, the load on each of the stages varies according to the transportation of coal, from 2.5 to 40-70 million tons per year; according to the transportation of overburden rocks, from 6 to 50-60 million tons per year. Thus, with consideration of the need for continuous operation of trenches and the difficulties of reconstructing the rails, each stripping should obligatorily be planned and constructed for maximum throughput capacity, calculated for the entire period of its exploitation. Non-observance of this condition and switching



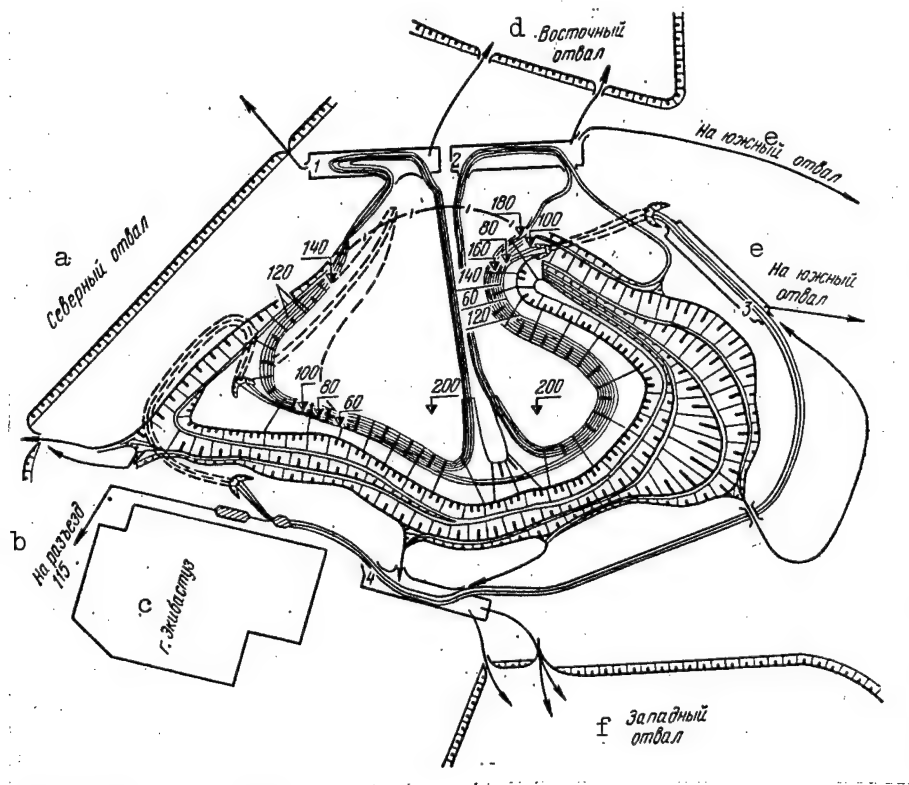


Fig 4. Diagram of Ekibastuz development by system of internal group trenches and tunnels

1,2,3,4 -- temporary storage places

a -- Northern dump

d -- Eastern dump

b -- To siding 115

e -- To southern dump

c -- Ekibastuz (city)

f -- Western dump

of freight traffic periodically from one trench to another has to lead to worsening of the use of equipment, increasing the cost of work and non-fulfillment of the planned shipments. The calculation of each permanent trench and its freight traffic of coal and overburden rocks must be done individually for the entire period of exploitation.

3. For deep horizons (over 250 meters) a reduction of the running of trains over horizontal and inclined rails is striven for, as well as the use of steeper grades and the assurance of continuity of motion of trains under conditions of low freight traffic, is possible by constructing several inclined single-track tunnels with a throughput in one direction of 180-200 trains per day. This will permit sharply reducing operating expenditures on transport and the construction of ineffective internal cross-overs. Additional expenditures on the construction of 4-5 kilometer tunnels are paid for in the course of 5-6 years at a tunnel throughput of 80-120 trains per day, and in shorter periods of time at larger traffic loads. The number of necessary tunnels and their placement should be determined by calculation for each stage of exploitation. For deep horizons it is possible to create 2-4 concentrated freight flows of coal. To bring all the coal faces to conveyer transport will be difficult; some of the coal will be brought out by railroad transport.

4. At a loading on the trench of up to 150 million tons per year and a throughput capacity (for organizational reasons) of not more than 350 loaded trains per day (with consideration of the reserve), the mass of a train must be at least 2,500 tons. Such trains must be loaded by mechanical shovels with a scoop with a content of 20-35 m<sup>3</sup>. For such large freight flows, which are expected in the long term at the Ekibastuz deposit (just as on the Kansk-Achinsk and other basins), a question of paramount importance is the creation of an especially powerful component of individual manufacture. To assure a useful mass of the train of 2000-2500 tons, cars with a loading capacity of 300-350 tons are necessary. Their creation under conditions of ordinary gage is practically impossible. Therefore a doubled wide gage should be used, with cars of special design with a locomotive consisting of four traction units which pull a train of 6-8 cars with a loading capacity of 300-350 tons. A probable diagram of the design of such a railroad car is presented on Fig 5.

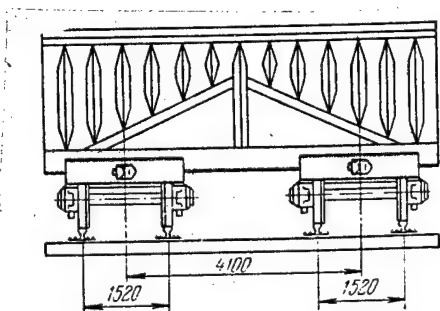


Fig 5. Design of a car of high capacity.

With consideration of the variable load of the main overburden workings (regardless of the number of strippings and mining sections created) on the basis of technical and transport conditions of the exploitation of the Ekibastuz mold, single overburden and mining quarry administration and a single transport-dispatcher administration ought to be accomplished. Only under that condition can efficient use of the basic equipment be achieved.

5. Especially important, requiring special working and the adoption of rational technical solutions is the problem of organization of the dumping economy and re-cultivation. To store 17 billion m<sup>3</sup> of overburden rocks (with consideration of the rocks overlapping seam 4--over 20 billion m<sup>3</sup>) and 3-4 billion tons of ash, enormous areas are necessary for the dumps. During the entire period of mining work it is necessary to recultivate 300-350 thousand hectares of land suitable for tree-planting and agricultural purposes, and to thus create a large, well-structured oasis in the surrounding steppes ecologically suitable for the habitation of that region. In that case additional sources will be required for irrigation of plantings, and other work must also be done on the good order of the territory.

With consideration of what has been said, the problem of transporting overburden rocks must be solved in a new way. It must be done in two stages.

Stage I. Rail transport within the quarry, with the delivery of coal and overburden rocks to storage sites close to the edge of the section. Powerful quarry transport, designed for steep ascents, will be effective on a circular design to service the main freight flow of the section. The train will move in a circle with a minimum number of switches and at high speeds. In that case the main goal is achieved--a

high level of use of excavators and means of transport, and a minimum of auxiliary work is assured. The unloading of trains of overburden rocks from the temporary storage sites must be done on especially constructed scaffolds. It is economically ineffective to use heavy specialized means of quarry transport to move coal and rocks to the surface at considerable distances.

Stage II. The movement of coal from storage sites to consumers with simultaneous averaging, and of overburden rocks in accordance with their quality--into dumps of recultivation or to processing enterprises. Useful utilization of overburden rocks is possible in the presence of specialized surface transport with secondary loading of rock mass from the storage sites. The displacement of rocks ought to strictly correspond to the needs of recultivation of lands and be accomplished by the dump-recultivation administration, which has specialized equipment available.

To assure the development of mining work at the Ekibastuz deposit in the contemplated volumes it is necessary to perform scientific and planning and design developments without delay:

- diagrams and systems of disposition of strippings (permanent trenches and tunnels) with calculation of the period of their functioning and loads by stages of the work and with consideration of the need to assure minimal duns over horizontal quarry rails. In that case rational working zones must be established for conveyer delivery of coal to the surface;

- the design of cars with a freight capacity of 300-350 tons on "doubled" rails, and also the organization of movement, loading and unloading of trains with especially large capacity. Similar cars of rail-less transport of the type of trolley trucks must also be created;

- diagrams and a procedure of movement of overburden rocks to dumps of temporary storage sites with consideration of the influence on green plantings. Here it is necessary to substantiate the type and capacity of specialized transport for shipments and stacking of overburden rocks in dumps 8-15 meters high with a large distance of transporting.

The solution of such scientific tasks in the course of 2-3 years will permit the timely creation of a new technology for especially large sections.

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## COAL

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### SYNTHETIC FUEL FROM COAL

Moscow UGOL' in Russian No 11, Nov 82 pp 35-36.

[Article by Doctor of Technical Sciences A. A. Krichko, Institute of Mineral Fuels]

[Text] At the present time the extraction and consumption of fuel of organic origin have reached 10 billion tons s. h. per year. A considerable part of it is used in various spheres of the national economy after appropriate processing, as a result of which products are obtained which differ substantially in quality and properties from the raw material. Oil and its fractions undergo refining (3.5 billion tons a year) by the methods of hydrogenization, cracking, pyrolysis, etc, as a result of which fuel is obtained for engines and raw material for industry. Bituminous coals and lignites undergo coking (0.5 billion tons), semi-coking and gasification, obtaining various types of solid carbonized material, liquid products and gas for fuel and chemical purposes, the properties of which, as in the case of oil refining, are formed as a function of the area of application. Thus, with the exception of coal and natural gas for energy consumption, the main mass of organic fuel undergoes deep chemical processing with the obtaining of synthetic products.

In the last 10-15 years, in connection with curtailment of oil reserves and increase of its cost in many countries of the world scientific research, planning-design and experimental work directed toward the creation of a promising technology of production of synthetic fuels from coal is being done, having in view the organization in the long term of the production from it of gasoline, diesel and reactive fuel, pure gas for electric power stations, synthesis gas and hydrogen for the chemical industry (the obtaining of methanol, ammonia and other products). Since coal reserves are far larger than those of oil, and in a number of countries they can be worked by the open method at relatively low cost, in the long term coal will become a supplementary source for obtaining raw material and materials now produced mainly from oil and natural gas.

The technology of production of liquid fuel and gas from coal was mastered in industry over 50 years ago and has been used in Germany, England, the USSR and other countries. At the beginning of the 1940's up to 5.5 million tons per year of motor fuel was produced from coal in Germany. At the end of the 1950's over 30 billion m<sup>3</sup> per year of combustible gases were obtained from coal in the USSR. At the present time in the world about 60 plants are engaged in the production of gas, and 3-3.5 million tons per year of liquid fuel are obtained from coal (the USSR, GDR and UAR) and combustible shales (the USSR and KNR).

Needed for the creation of highly productive economically effective technology of synthetic fuel production from coal is the development of new processes, as the existing ones cannot be used in the long term for wide mass-scale production.

<u>Process</u>	<u>Production</u>	<u>Efficiency, %</u>
Coal hydrogenization	Gasoline, diesel fuel, gas	56
Gasification and synthesis of methanol	Methanol	49
The same + methanol processing into gasoline ("Mobil")	Gasoline, gas	45
Gasification and synthesis ("Fisher-Tropsch")	Gasoline, diesel fuel, gas	40
Petroleum refining	Motor fuel, gas	85

Liquid fuel can be obtained by methods of direct hydrogenation of coal, preliminary gasification of coal and synthesis from gas, and also synthesis of methanol and its subsequent refining. The most efficient of those is the method of hydrogenation of coal (see table). However, that method is applicable for coals with an ash content of 10-12 percent. Coals difficult to clean must undergo gasification. The cost of an enterprise to produce 3 million tons of motor fuel a year is 2-2.5 billion dollars, according to the estimates of American and West German companies. In that case up to 20 million tons of coal of the Kansk-Achinsk type would be required. Considering the growing need for synthetic fuel and the cost of organizing its production, a search is being conducted for a very efficient technology.

In the USSR, in the Institute of Mineral Fuels, Grozgniproneftekhim and the All-Union Scientific Research Institute of Chemical Machinery a technology is being developed for the hydrogenation of coal under a hydrogen pressure of 10 MPa (instead of 30-70 MPa previously used in industry), and at the "Bel'kovskaya" mine of the "Novomoskovskugol'" Combine an experimental installation is being constructed for developing a technology for obtaining experimental lots of motor fuel and refinement of the technical and economic indicators of production. According to preliminary data, with respect to coals of the Kansk-Achinsk basin in the 1990's the obtaining of liquid fuel will be more profitable than oil refining. Work in that direction is being done in cooperation with the GDR and PNR.

It is proposed to complete construction and put the equipment in operation in 1983. The experimental-industrial installation planned on the "Berezovskiy-1" section of the "Krasnoyarskugol'" Combine will be constructed slowly. The start-up of the installation, planned for 1984, has been moved to 1985. This installation is very important for obtaining data which must be made the basis for the planning of the first industrial enterprise. For that it is necessary no later than 1985 to complete the construction and put in operation an ST-75 installation on "Berezovskiy" section No 1.

For the production of synthetic gas from coal in the USSR and abroad work is being done on the improvement of existing technology of gasification of coal and the creation of new processes. In the United States more than 30 experimental and pilot plants have been created and are being operated. In the FRG a technology is being developed for obtaining gas for energetics, synthesis gas, hydrogen and gas for household purposes.

In the USSR research and planning-design work is being done on the creation of processes for gasification of coal by steam-air blast to obtain gas purified of sulfur compounds and dust, for combustion under boilers of electric power stations with a steam-gas cycle. Coal gasification, developed by the Institute of Mineral Fuels jointly with the Central Scientific Research, Planning and Design Boiler and Turbine Institute imeni I. I. Polzunov and other organizations, will be accomplished in a fluidized bed of fine-grained coal at a pressure of about 2 MPa. In the steam-gas cycle pure gas with a temperature of 500-700°C will be used, which will permit raising the efficiency of fuel use and reducing its expenditure by 7 percent in terms of the supplied kilowatt-hours. In addition, thanks to simplification of the boiler equipment working on gas and not on coal, the metal content of the complex will be reduced by about 20 percent. In the 11th and 12th five-year plans it is planned to erect and organize a pilot plant with a capacity of 250 MWt.

However, work on coal gasification using steam-oxygen blast to obtain synthesis gas and hydrogen is being done still more slowly. Due to the absence of a modern technology of coal gasification on the ST-5 plant of the "Novomoskovskugol'" Combine the production of hydrogen is planned on the basis of electrolysis of water, and on a S-75 plant of the "Krasnoyarskugol'" Combine, the conversion of liquefied petroleum gas. For the industrial production of synthetic liquid fuel it is necessary to have in the makeup of the enterprise installations for obtaining hydrogen from coal.

It is necessary to adopt imperative measures on the development of a modern highly efficient process, all the more so because experimental-industrial tests of Kansk-Achinsk coals on installations of the ChSSR and FRG have permitted estimating them as raw material very highly suited for gasification.

In the area of gasification of Baltic combustible shale by organizations and enterprises of the USSR Ministry of Petroleum Refining and Petrochemical Industry definite successes have been achieved. In recent years a new gas generator with a capacity 5 times larger than that of existing gas generators has been created and is being successfully operated. The equipping of such gas generators of the shale-processing industry will permit substantially increasing the production of gas, liquid fuel, and chemical products, improving the technical and economic indicators of shale processing and proceeding to the planning and erection of still more powerful installations, the capacity of which will correspond to the expected scales of processing of solid fuel.

A special place in the problem of solid fuel gasification is occupied by underground gasification. At the present time interest in this process is increasing. In the United States a number of stations are being built and operated under a USSR license. The FRG and Belgium are working on implementation of a joint project of gasification of thin seams at a depth of 700 meters or more. In the USSR two underground gasification stations are being operated, but the work on improvement of the process and expansion of its application is practically not being done.

In connection with drawing into the sphere of use low-grade (high-moisture and ash) solid fuels (lignite and combustible shales), which are widespread in most regions of the country, definite importance is being acquired by processes of enrichment of those types of fuels: the obtaining on their basis of high-caloried fuel for electric power stations and household consumers. For that purpose a technology of pyrolysis of fuel and the caking of fine classes is being worked out. To obtain liquid boiler fuel and gas from high-ash combustible shales the Power Engineering Institute of the USSR Ministry of Power and Electrification has developed a technology for rapid pyrolysis with a solid heat-transfer agent. The installation

of a UTT-3000 is in the stage of tests. An ETKh-175 is being constructed for the pyrolysis of Kansk-Achinsk coals and the obtaining of fine-grained coke which can be used as a power fuel, carbide reducing agent and raw material for sintered household fuel production. A simpler technology for obtaining high-calorie fine-grained fuel has been developed by the Institute of Mineral Fuels. In the 12th Five-Year Plan it is planned to create a "Termougol'100" installation. However, that installation is being slowly planned and constructed, in spite of its relatively low cost, mainly on account of lack of interest of the corresponding ministries in the production of synthetic solid fuel.

Thus, as a result of the large volume of work being done by research and planning-design organizations and industrial enterprises, in the country the scientific principles, technology and apparatus formulation have been done for new, economically effective processes and production facilities. Plans have been made, experimental and pilot plants have been constructed and are being constructed for processing coal and combustible shale into synthetic liquid, gaseous and high-calorie solid fuel and chemical products. However, the construction and organization of those production facilities is proceeding at a slow rate, and this is holding back the development of new technologies and the planning of corresponding industrial complexes. The USSR Gosplan, the State Committee for Science and Technology, ministries and departments should adopt coordinated decisions for the purpose of assuring the progress in developing new directions of the fuel-processing industry.

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## COAL

### SEVERNAYA MINE CEASES MANUAL MINING

Moscow PRAVDA in Russian 22 Feb 83 p 1

[Article by A. Bogachuk, correspondent: "Tunnelers Dictate the "Mode"]

[Excerpts] The steel doors of the air lock chamber clank behind your back and the change in air pressure makes it feel like cotton wads are stuffed in your ears. A walkway so narrow that two people couldn't pass drops steeply into the darkness. It's hard to believe that somewhere up above the birch trees are covered with frost and sparkling in the sun.

A. Bulgakov, a tunnel driving brigade leader, met me in the installation area for the new longwall. Together with his comrades, Anatoliy Ivanovich has completed the last operations in shaping up the room and preparing for the installation of the mechanized complex. In other words, longwall No. 206 had already "become engaged" and was well known to the mechanized brigade of G. Ipotenko.

The day before I had visited this collective. Not finding the brigade leader himself, I got acquainted with the unit of Viktor Shabalin and coal combine operator Vladimir Shaposhnik. Like many brigade members, until recently both had been engaged in manual coal extraction. A little more than a year ago mechanized longwall mining had begun. With the help of an instructor, they had learned how to operate the machine, and had passed the 1,000 tons per shift mark.

Now it is truly time to talk about the Severnaya Mine as a whole. Until recently coal was mined manually, for a long time conditions did not permit the use of integrated mechanization. It had even been planned to have the mine work out its reserves and close.

Miners in the collective and specialists found it possible to give the enterprise a second youth. On their own, miners partially rebuilt the mine, built a substation, ventilating installation, and a building for lift machinery. During these difficult days of reconstruction, the tunnel driver's profession became almost the most important one at the mine.

Today, as they say, tunnelers dictate the fashion at the mine. The mechanized extraction of fuel has put the problem of accelerating tunnel driving work on the day's agenda. Last year demonstrated vividly that problems with tunnel



drivers can turn into great losses for the entire collective. Last spring G. Ipotenko's brigade did not get assigned a new longwall and came up 30,000 tons short on coal extraction. True, extraction workers were able to make up the shortfalls and the mine as a whole overfulfilled its targets, but the annual results might become more ponderable.

The contract method helps here. On the basis of creative cooperation with G. Ipotenko's brigade, they undertook the accelerated preparation of a new longwall. Having organized simultaneous work on two faces, the brigade attained an average monthly rate of advance of up to 500 meters. In its turn, the mechanized brigade undertook to daily extract at least 1,000 tons of coal from the new longwall. Auxiliary workers, delivery workers and riggers, underground equipment operators, arc welders, also became involved in the friendly work. The conversion to piece rate wages sharply improved discipline and efficiency in the work of this category of miners.

Section chief V. Obukhov explained: "There are no idle people at the face now. Manage your own work and help your comrade, such is the rule at the brigade. The former hourly rate workers were not losers. Their pay has increased by one-third, and the personal labor contribution of each by more than 1.5 fold."

Performing all preparatory work, right up to installing conveyors and conduits, the brigade found it possible to reduce the total number of workers in the section collective by 19. While last year A. Bulgakov's miners drove 2,800 meters of tunnels, this year they must do 4,000 meters and prepare for the extraction of almost 900,000 tons of coking coal.

There are two mechanized extraction brigades at the Severnaya Mine. In the immediate future they intend to set up yet another mechanized work face here. During the five-year plan enterprise labor productivity has increased 1.5 fold. Tunnel drivers, the first ones to push through to the earth's depths, lead the way to this, just as to new coal reserves.

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## COAL

### VATRA PRODUCTS USED IN MINING INDUSTRY

Moscow EKONOMICHESKAYA GAZETA in Russian No 9, Feb 83 p 4

[Article by A. Tarankov, engineer: "Advantages of a Counter Plan"]

[Excerpts] Products from the Vatra Production Association go to hundreds of places. This output includes starting and control units, optical instruments for the coal and mining industries, cultural and service goods: chandeliers, lights, and table lamps. Last year the enterprise's collective successfully fulfilled its counter plan. For achieving high results in All-Union socialist competition it was awarded the Red Challenge Banner of the CPSU Central Committee, the USSR Council of Ministers, the AUCCTU, and the Komsomol Central Committee. Vatra workers have also assumed a counter plan for this year. During 1981-1983 production will grow by 19.3 percent. This is higher than intended by the five-year plan targets. Production will increase through improved labor productivity, scientific and technical progress and economizing.

This year Vatra workers are modernizing 12 percent of the product assortment of lighting equipment for mines and pits. They are mastering the series production of lights and switches for small capacity gas discharge high pressure lamps. These make possible a 10 percent reduction in electrical energy consumed for lighting.

In addition to the state plan for 1983, the collective has undertook to produce 200,000 rubles worth of products, and exceed the labor productivity growth target by 0.3 points. The counter plan has been approved by the Ministry of the Electrical Engineering Industry.

Starting and control units and other items are manufactured from special steels, copper, and other scarce materials. It is not possible to increase their stocks. The Vatra collective has not even asked for this. They are counting on reducing consumption norms and saving at least 880 tons of ferrous and nonferrous metals.

A number of design innovations, and the introduction of semiautomatic machines combining the winding and welding operations have made possible a 10 percent

reduction in the copper used for each starting unit coil. A functional cost analysis has come to the conclusion that thanks to changes in the design of terminal blocks (the use of screwless fasteners for installation wires) it would be possible to reduce the use of nonferrous metals and labor intensity of assembly operations. The proposal was implemented and labor savings amounted to 16 workers.

The comprehensive brigade for the manufacture of flexible supports for lights, led by lathe operator Ye. Vil'gar calculated that through the elimination of a bottleneck in the "crimping" of couplings, production could be increased. The process engineer D. Morozovich came to their assistance. Together they developed and manufactured a brilliant attachment. The operation was automated. While previously here it had been intended to increase labor productivity by 2 percent, in the counter plan it will grow by 17 percent.

In cooperation with the designer V. Kononenko, and the technologist Ye. Lationoviy, Hero of Socialist Labor, fitter P. Kustra has created a unique casting form for making a light difuser. Such forms had previously been purchased abroad. The initial plan for the production of these cultural-service items was increased by 15,000 rubles

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COAL

## MINERS NEED BETTER LAMPS

Moscow PRAVDA in Russian 13 Feb 83 p 2

[Article by Vyacheslav Goncharov: "The Flame in the Mines"]

[Text] A miner needs light in a mine, without it he cannot work. If his lamp goes out then his comrades working right next to him simply must share their rays. The problem is that such "chp" [emergencies] happen frequently. As N. Oleynikov, a tunnel driver bridge leader at the Zapadno-Donbasskaya Mine from Dnepropetrovsk Oblast reports to PRAVDA: "The batteries do not last very long. Sometimes during a shift they have to be lifted to the surface and there is a long wait for a replacement." What is the reason for this?

The sector still used a large number of old style batteries. Electrolyte must periodically be added. However, in the mines the liquid is often spilled. This not only means deteriorated lighting conditions, but also the threat of fire.

For about 20 years now the nation has been making excellent hermetically sealed batteries which only need charging from an electrical source. Their use would completely solve the problem of individual lighting at working faces, make it possible to convert to mine self-service lighting, and free 12 lamp ladies [lampovshchitsa] for every 1,000 units. It is easy to calculate the huge reserves of labor resources available to the sector just in this area of work. However, this is not all.

The USSR Ministry of the Coal Industry has verified that the service life of a hermetically sealed battery is more than two times longer than for a liquid battery. This means that in the long run fewer units have to be made. There would be reduced use of such scarce materials as cadmium and nickel. Why then the standstill?

The Electrical Engineering Industry is only half meeting miners' orders for sealed batteries; this year the sector ordered 750,000 units and was promised only 360,000. The remainder are liquid units. However, the promised units do not always wind up in their hands. During the first 2 years of the five-year plan miners came up 70,000 economical batteries short of the plan. Because of this almost as many headlamps were not produced.

It is suprising that a solution to such a major problem, touching upon the interests of the entire sector, has been stretched out for a decade. At the

Soyuzelektroistchnik All Union Production Association this is explained by a shortage of capacity at the Voroshilovgrad plant for alkaline batteries, the main producer of economical batteries. It has long been possible to rebuild the plant or build a new one. Incidentally, such a plant is being built at Velikie Luki. Its first section was put into operation the year before last, and the second will start work this year. However, it was decided to only produce batteries for miners in the third section. They will have to wait.

One can, of course, continue to wait. However, the builders are not hurrying with this project, which is clearly not beneficial to them: the volumes are small and there is no special incentive to complete the work. Therefore, the project moves along in a slipshod manner.

Thus, many miners must arrive at the working faces with obviously unreliable lights.

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## COAL

### COAL MINERS SUMMARIZE OPERATIONS

Moscow IZVESTIYA in Russian 11 Jan 83 p 2

[A series of short articles and reports, no common title]

[M. Reshetnikov, miner brigade leader, Zyryanovskaya Mine, Yuzhkuzbassugol' Association, Hero of Socialist labor]

[Text] They say that technology now gives miners herculean strength. This is true. I began work in the mine as a timberer. As they say, I carried heavier timbers a little further. This was suffering, not work. Then, however, there was no other way to do it. Later I worked at the Donbass and Gornyak combines. Now these complexes have been developed. It goes without saying that the work went well. Miners loaded a thousand tons a month. The brigade, working on 2 faces, undertook to mine 1,480,000 tons of coking coal annually. Other collectives have also successfully handled their obligations. The mine overfulfilled the plan.

This year the plan calls for increasing coal extraction in the Kuzbass to 149,870,000 tons. To be frank, it is a difficult goal, which counts on the mobilization of internal reserves at operating enterprises. However, remember how we worked here to pass the remarkable achievement of 150 million tons, it was such a stimulus to expanding militant socialist competition! It is essential to repeatedly examine the possibilities of each working face, section, and enterprise, take them into account, and use them at maximum effort. Our collective had a discussion about this. It decided to extract at least 1,200,000 tons of coking coal in the third year of the five-year plan.

[A. Polishchuk, miner brigade leader, Trudovskaya Mine, Donetskugol' Association, Hero of Socialist Labor]

[Text] In the middle of December, it had never previously been so early, our brigade reported to the Motherland that in 1982 it had lifted 1 million tons of coal to the surface. For the fifth time our section, which is lead by twice Hero of Socialist Labor, deputy to the USSR Supreme Soviet, and former brigade leader Ivan Ivanovich Strel'chenko, has achieved the million ton mark.

We have kept our word, and 92,300 tons of coal in excess of the annual plan have been produced.

However, it is best to speak about past successes in comparison to plans for the future and forthcoming targets. In 1983 we are obligated to extract 756,000 tons of coal, including 10,000 above the plan. We could be asked: can this be so, assuming obligations lower than the attained level? I want to say that it is.

Our obligations are not so great as last year. However, is it good to promise something and then not do it? We do expect greater difficulties. We have to complete the move to a new 330 meter longwall where there will be quite a few problems with roof control, considerable preparatory work, dust and gas conditions will be worse and safety rules be stricter.

Nevertheless, as is said, we believe in our star. The collective is very united and friendly, its people are dedicated to the job.

[N. Skrypnik, miner brigade leader, Mine imeni M. V. Frunze, Roven'kiantratsit Production Association, winner of the Leninist Komsomol Prize]

[Text] Last year our brigade was again true to the established tradition. For the fifth time since the beginning of socialist competition among "millionaire" brigades, it has fulfilled its promised socialist obligations for 1982 extract a full million tons of coal.

It wasn't easy. There were difficulties in moving from one longwall to another, sometimes equipment let us down and there were disruptions in the supply of spare parts. All the same, we endured. The miners selflessly struggled to keep their word.

Incidentally, for some reason this obligation was not taken into consideration in the distribution of bonuses. Apparently, USSR Minugleprom [Ministry of the Coal Industry] and the Central Committee of the Coal Industry Workers Union must have a more differentiated approach to evaluating the contributions of collectives such as ours. This should include what the collective promised and how it kept its promise.

There is also another major question: new equipment. One should think that the time period for exchanging mechanized complexes should be linked to final work results and should certainly be conditional upon these results.

When talking specifically about what we plan to do in 1983 in order to extract the next million tons of coal, I want to state: we will improve the transportation of coal from the face to the freight cars, intensify competition between units, select people in units on the basis of complete psychological compatibility, and continue to strengthen labor and technical discipline.

[K. Markelov, miner brigade leader, Mine imeni 50 Years of Oktyabra, Gukovugol' Association, Hero of Socialist Labor]

Our brigade produced its million tons 26 days earlier than the planned deadline. What helped us achieve this result?

Miners' sharpness and experience had a great influence. Our innovators proposed improvements in the M-87E support. One should note that this unit has failed

us before. In addition, it required considerable working time to move it. With designers' help, machinery builders succeeded in making an increased strength support on the basis of the old model.

We have instituted another innovation: we have started working four shifts. Three of them extract coal, while the fourth is exclusively engaged in repairs. This restructuring has resulted in reduced intra-shift down time and improved equipment utilization. Labor productivity has climbed.

We are glad that the good results were not obtained at any price, but efficiently. The decisions of the CPSU Central Committee November (1982) Plenum point every working collective towards this.

Our collective has now decided to extract 1 million tons of anthracite. The results of the year's first workdays convince us that we are quite capable of this. We have already extracted more than 11,000 tons, almost 4,000 tons of which is in addition to the plan.

[M. Chikh, miner brigade leader, Mayskaya Mine, Rostovugol' Association, Hero of Socialist Labor]

[Text] Our brigade had a good miner's gift for the 60th Anniversary of the USSR. For the ninth time we produced 1 million tons of coal in a year. However, now our road is a special one. This coal was extracted with great difficulty because starting in April 1982 the brigade began working a thin seam. The main thing we counted on in such conditions was the great skill of our units. I personally, as a brigade leader have been repeatedly convinced that the more difficult the situation, the greater is people's responsibility for results, and the more intensely they strive to overcome the difficulties.

Machine builders at the Druzhkovka plant, our old friends in socialist competition with the Ukraine, helped us considerably in reaching the planned goal. At the brigade's request they rapidly built a MKS-U cutter especially intended for extracting coal from thin seams. Although it didn't always work flawlessly, it was of good help to us.

In discussing our socialist obligations for the third year of the five-year plan, we have accurately estimated which reserves for increasing coal extraction here still remain unused. The complex is working more reliably. We ourselves, machine builders, and mine specialists are working on its improvement. This means that there will be a greater flow of anthracite and that work time will be more fully used. It is also planned to deal with any violations of labor discipline more strictly, in a manner suited to miners.

[V. Devyatko, miner brigade leader, Raspadskaya Mine, Yuzhkuzbassugol' Association, Hero of Socialist Labor]

Comprehensively mechanized longwalls now mine more than 90 percent of the coal produced at our mines. This means that the main reserves which we must put



into action lie with these machines. Take our brigade for example. The new complex developed by the Scientific Research Institute for Coal is undergoing testing and development in our mine. It has many good features. It is sufficient to note that for the third year in a row the brigade has extracted one million tons. Not every mine is capable of this. However, practical work is constantly revealing imperfections in various units and assemblies: something has to be strengthened, something has to be changed. Last year alone there were 16 innovators proposals and they all found applications.

Is this good? That depends upon how you look at it. It is good that the creative activity of workers and engineers is growing. This is the brigade's strength, the basis of its stable, highly productive work. However, the complex has its inventors and designers. When it is being tested they spend day and night at the mine, working together with us at the face. When the machine goes into series production, we part ways. This isn't right. We think that the obligations of inventors and designers should include supervision of the equipment for at least a year. Somebody must study and disseminate the improvements arising in practical work. There will be huge benefits from this.

The brigade has firmly decided not to reduce the pace, and extract at least a million tons of coal.

[A. Kolesnikov, miner brigade leader, Molodogvardeyskaya Mine, Krasnodonugol' Association, Hero of Socialist Labor: "Don't Let the Complex Down..."]

[Text] Last year our brigade was, one might say, a success for the collective. During that year it extracted 860,000 tons of coal, including 100,000 above the plan. Like other brigades, during 1983 ours assumed high socialist obligations.

Things are not bad for us. However, miners are not ones who have a habit of being satisfied with what has been attained. We now see great reserves in the new complex which has arrived at our longwall and which, if we have a mind to it, can be a more effective coal extraction method.

It was created by designers at a scientific research institute near Moscow. The supports themselves are successful, but the control panel, created by another institute, is very imperfect. The same might be said about the K-10 combine. It was also built by the specialists from the Moscow area, it is also not bad, but its system for controlling coal dust unfortunately leaves much to be desired. Our miners say that it is only good for watering a lawn.

Undoubtedly, miners must do everything to successfully meet the obligations they have assumed, but it is essential that their difficult work be more strongly supported by the scientific, design, and manufacturing rear area.

[V. Ignat'yev, miner brigade leader, Krasnolimanskaya Mine, Krasnoarmeyskugol' Association, winner, USSR Stat Prize: "A Cherished Mark"]

We became millionaires in 1980, and since then we have not succeeded in reaching that cherished mark. Why haven't we been able to realize our dream?

Apparently, it is for the same reason that prevented Aleksandr Kolesnikov's brigade at the Molodogvardeyskaya Mine in the Krasnodon from reaching the planned

goal. We both are using the very same equipment at the face, and the same problems are arising. Judging from experience, the supports and combine now in operation require design refinements.

We did fulfill our obligations in 1982. Promising 700,000 tons of coal, we extracted 834,000. It looks like everything is in order, but it's not. We are now finally planning to produce 1 million tons. This is the first part of our collective's socialist obligations for 1983. We will do everything in order to do what was planned.

It would be much easier for us to reach the goal if the Krasnoarmeyskugol' Association, Ukrainian SSR Ministry of the Coal Industry, the Druzhkovka machine building plant and other plants would improve the supply of spare parts for the longwall mining equipment, and if not only brigade miners would worry about the possibility of extracting a million tons from the longwalls.

[Unsigned article: "Figures and Facts"]

[Excerpts] The brigade led by Hero of Socialist Labor M. Reshetnikov at the Zyryanovskaya Mine in the Yuzhkuzbassugol' Association was the victor in the socialist competition of "millionaires". In 1982 it extracted about 1.5 million tons of coal, the best result of the jubilee year.

At the Yuzhkuzbassugol' Association almost 80 percent of total extraction is by "thousand-er" brigades. There are 43 brigades extracting at least 1,000 tons a day. The Krasnoarmeyskugol', Dobropol'yeugol', Gidrougol', Rostovugol' and Gukovugol' Associations have successfully met targets for the number of "thousand'ers".

Strip mine coal extraction is growing at pace setting rates. Collectives at strip mines produced 4,8 million tons of coal above the plan.

Last year there were pay increases for more than 1 million miners and mine builders at the Donets, Kuznetsk, Karaganda, and Pechora coal basins. Workers' pay increased by 9.9 percent, and for engineering-technical personnel the increase was 10.9 percent. Preparations are being completed for the introduction of the new pay in remaining basins.

The pay system is also being restructured. Emphasis has been placed upon the collective payments for labor, and bonuses are more closely tied to end results.

Among the teachers [nastavnik] last year were 189 "thousand'er" collectives, who obligated themselves to bring the units under their patronage up to 1,000 tons of coal daily. Sixty eight brigades reached the cherished mark.

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COAL

## COAL MINES RESPOND TO PAPER'S CRITICISM, TAKE ACTIONS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Feb 83 p 2

[Unsigned article: "The Newspaper Speaks. What Was Done? The Equipment was Allocated"]

[Text] The information under the heading "We Report the Laggards" published in this paper on 16 September 1982 discussed the reductions in coal extraction and the lagging in mining operations at enterprises in the Pavlogradugol' Association's enterprises. N. Surgay, first deputy minister of the Ukrainian SSR Ministry of the Coal Industry reported to the editorial board that the article was discussed at the ministry. The criticism of the association and the ministry were considered fair. Ye. Ponomarev, general director of Pavlogradugol' was reprimanded for not taking measures to improve operations at the Samarskaya, imeni Geroyev Kosmosa, Dneprovskaya, and other mines.

The republic coal ministry has developed additional measures to improve the situation, increase extraction, and expand mining operations. In the fourth quarter of last year 17 longwalls were prepared and put into operation, 4 of them to make up for the work front at unsupplied mines. During this time extraction at comprehensively mechanized faces exceeded 2.6 million tons, including 65,000 tons above the plan. The number of high speed tunneling brigades has been increased to 21, and there are 3 brigades which extract 1,000 tons and more per shift.

Measures were taken to staff the mines with tunnelers, reduce their diversion to extraneous work and to increase executive discipline. Resources have been allocated from the ministry's fund to provide material incentives to workers, engineering-technical personnel and management workers to fulfill the targets for coal extraction. On 26 December Mine No 21-22 was put into operation. The association met the annual plan for coal extraction. The ministry has taken measures to put material and equipment funds into use. During the fourth quarter the mines were delivered 5 tunnel driving combines, 4 rock loaders, 1 rock cutting machine, and other mining equipment.

For 1983 the association was allocated 20 rock tunneling combines in order to complete the planned volume of output.

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## COAL

### KATEK COAL CONVEYOR UNDER CONSTRUCTION

Moscow GUDOK in Russian 11 Mar 83 p 4

[Article by L. Nizhegorodtsev: "The KATEK [Kansk-Achinsk Fuel and Energy Complex] Conveyor"]

[Text] Kansk-Achinsk, a unique basin of brown coal [lignite] deposits is located in western Krasnoyarskiy Kray. Here there are now more than 400 billion tons of explored reserves. Nature also took care to see that people could extract this wealth by the most effective method -- strip mining. Incidentally, the production cost of coal lying near the surface is one-fifth that of coal which must be mined by underground methods. It has therefore been decided to form the Kansk-Achinsk Fuel and Energy Complex (KATEK), one of Siberia's largest, here.

The complex is being built, however it has already been operating for the five-year plan. The large coal strip mines of Nazarovskiy and Irsha-Borodinskiy are already operating and the Berezovskiy is gathering strength. Last year almost 37 million tons of coal were extracted from KATEK's strip mines, and by the end of this decade the figure will double.

Many scientists and engineers are working on specific programs for KATEK. One of the main tasks is the program for using this coal to make high quality liquid fuel for engines. It is difficult to overestimate the promise of this direction, for, as is known, the new synthetic fuel, equal to ordinary gasoline, kerosene, and solar oil will be obtained here not from scarce, expensive petroleum, but from low cost brown coal.

KATEK coal here, in Krasnoyarskiy Kray, will become a fuel for thermal electric power plants. During this and the next five-year plans the Beresovskiye GRES, with two of Siberia's most powerful thermal electric power plants, will be built. Each will have a capacity of 6,400,000 kilowatts.

It is understandable that it would take huge amounts of coal to generate so much electrical energy. It must be delivered from the strip mines to the GRES. This would require hundreds of large capacity multi-ton dump trucks such as the BelAS. and it would mean building a wide reliable road, a road workers repair base, and a settlement on the mainline.

However, scientists and specialist have selected another way to move the flow of coal to the Berezovskaya GRES-1. Here has begun the construction of the 15 kilometer conveyor system with two powerful belts, unprecedented in our nation's experience.

At present associates of the general planner and designer of the conveyor, the Sibgiproshakht [Siberian Institute for Mine Planning and Design], the All-Union Scientific Research Institute for Underground and Transport Machine Building, the USSR Ministry of Heavy and Transport Machine Building, and Giprokhimmontazh of the USSR Minmontashspetsstroy [Ministry of Installation and Special Construction Work] are seeking the most economical solutions to accelerating the work of builders and installation workers.

At the Giprokhimmontazh Institute I met M. El'yash, the main technologist and a participant in the designing of the unique giant conveyor.

He explained: "The powerful 15 kilometer long, 2 meter wide belts will be made from a specially strengthened rubber and cable material. The belts will weigh 7,300 tons. We have planned all installation work for this unusual installation, and have used the most progressive methods for organizing flow line large unit installation on the spot."

The conveyor will haul up to 100,000 tons of coal an hour from the strip mines to the power plant in any kind of weather. What a gigantic flow! There is obviously no need to explain how necessary it will be for all parts and machinery to be wear resistant. I will only say that about 50,000 rollers, over which both belts will move, are being made from special steel alloys. The speed at which the coal moves, 180 meters a minute, is fairly high.

In order to ensure reliable operation the conveyor is divided into 3 kilometer sections. Each of both belts in a section will be equipped with their own belt drive station and powerful electric motors. An operator at a panel will operate and service the conveyor.

Today on the right of way representatives from Giprokhimmontazh are selecting the site for organizing assembly of sections together with the Berezovskaya GRES-1 and the Berezovskiy Strip Mine. Here, at special areas, installation workers will begin to assemble galleries and metal structures of the line part of the installation. When completely ready, with all the technological "fillings", the 30 meter long sections will be delivered to the installation sites on powerful prime movers.

Dozens of manufacturing enterprises are participating in the construction of the giant coal facility. Time is rushing by, after all, the first section of the KATEK conveyor should be operating already by next year.

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## COAL

### NEW MOBILE TRANSFORMER FOR USE IN MINES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 8 Feb 83 p 3

[Article by V. Antonov, general director, Avtomatgormash Scientific-Production Association, candidate of technical sciences, Hero of Socialist Labor; and I. Strel'chenko, section chief, Trudovskaya Mine, twice Hero of Socialist Labor, winner of the USSR State Prize: "The Innovation Has Gone Into Series"]

[Text] A command was heard: "Attention! Spark!"

A light click resounded, and the instruments on the testing chamber registered an explosion on the order of 14 atmospheres.

The laboratory is testing the newest electrical equipment for the very difficult conditions in the coal, gas, chemical, and other sectors of the economy. It is being worked on by a large collective of workers, specialists, and scientists from the "Explosionproof Electrical Equipment Scientific Production Association" in Donetsk.

It is here that one of the innovations for the coal industry was born. It is a portable transformer substation for mines. Until such units were built all extraction sections had huge substations with oil cooled transformers. Special underground rooms were built for them. However, as the longwalls moved forward and the equipment "traveled" along behind it, substantial material and labor outlays were required. Just the construction of a single room required 3,000 - 4,000 rubles. The complete excavation of one longwall required 4-5 such rooms, and the sector as a whole spent about 30 million rubles for this purpose.

The situation became even more difficult when mines began to develop deeper galleries, where working conditions got worse and electrical energy needs grew sharply. Moving the substations began to delay seam extraction work. A fundamentally new approach to supplying electrical energy was needed. Specialists were faced with harsh conditions: the new equipment had to be explosionproof, compact (dimensions were constrained by tunnel size), reliable and convenient.

Specialists and scientists at the Donetsk Institute of VNIIVE [All-Union Scientific Research Institute for Explosionproof Electrical Equipment] became involved in this work. They selected new materials, created devices and instruments, and worked out plans for the rational arrangement of substation

equipment. The Donetsk workers were helped by scientists and specialists from the Russian Federation and Belorussia. Thousands of experiments were made. It is now difficult even to say how many different variants were tested. However, what was created has made a marked contribution to the development of the coal industry.

The explosionproof features of equipment have improved and there has been a simultaneous reduction in metal intensity. How has this occurred? A special discharge-relief system was created, making it possible to control the force of the explosion and reduce its destructive effect. What is more, this innovation made it possible to reduce metal consumption in the production of these units by 1,000 tons annually.

There was also an interesting solution to the problem of transformer cooling in mine conditions. The traditional oil had serious shortcomings in addition to its positive qualities. It was replaced by a new cooling system. It has special tubes which remove heat from the transformer windings to the finned surface of the casing. This system ensures minimal temperature change, making it possible to reduce the use of winding copper by 200 kilograms per substation.

They also succeeded in solving the problem of moving the apparatus. It was installed on a special trailer which moves freely behind the longwall. There is thus no longer any necessity to build rooms. Labor costs for section servicing have been reduced and the amount of energy available has increased. All this has made it possible to increase the load at working faces.

The new equipment has received general approval by miners. They have attested to its high quality. All items of this type have been awarded the honorary pentagon.

The association's collective is now creating a new generation of equipment making possible further increases in the energy available to coal enterprises.

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## COAL

### BRIEFS

PAPER NAMES LAGGARDS-- Selidovugol' Production Association. For the third year Selidovo miners have not been able to make up the gap, and their debt to consumers is growing ever larger. This year they were 120,000 tons short of the plan. One-third of this shortage was in the first 10 days of February. Of the seven mines in the association (S. Yanko is general director), only the Gornyak is meeting the targets. This is explained by the constant concern about the working front, efficient care for equipment, and the skilled organization of work. Unfortunately, the experience of the has not become the property of the lagging enterprises, they are pursued by a high accident rate and idle time. The situation is especially bad at the Kurakhovskoye and Novogrodovskoye Mine Administrations, and the Mine imeni Korotchenko and the Ukraina Mine. The reason lies in the unsatisfactory state of the mine fund. However the USSR and the UkSSR Ministries of the Coal Industry are only slightly involved in long term problems in the development of mining operations at the lagging Selidovo enterprises. Although management elements at the mines are being actively strengthened, current problems are not being solved with sufficient effectiveness. The enterprises are short several hundred workers in the basic specialties. There are not enough tunnel drivers in the recently created mine construction administration. This understandably follows from the fact that the mine has not built enough housing. The conditions at face coal removal lines are of special concern as they are lagging behind the extraction brigades. Last year tunnelers were 3.6 kilometers of tunnels short. There is one law here: no preparation for the longwall means no coal. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Feb 83 p 3] 11574

TUNNELING MACHINE TESTS -- This innovation by the Kopeysk Machine Building Plant imeni S. M. Kirov has unusual strength for such a machine. After successful testing, the experimental model GPK-2 heavy tunnelling combine is gnawing through the hard earth at the Komsomol'skaya Mine of the Chelyabinskugol' Combine. It must dig a path 1,050 meters long, cutting through the strongest rock. The new machine is equipped with a special 110 kilowatt electric motor and the working units are high strength cutters not afraid of any kind of rock. Perhaps the most notable thing is that the basis of the underground Hercules is the running gear of the T-130 Chelyabinsk industrial tractor, a reliable and maneuverable machine. Since the beginning of underground testing the GPK-2 has already dug 250 meters of 18 square meter cross section tunnel through the hardest rock. This year the Kopeysk machine builders are sending the nation's miners the first group of the powerful new machines. [By G. Shcherbina] [Text.] [Moscow IZVESTIYA in Russian 22 Feb 83 p 2] 11574



NEW SCRAPER -- Scraper conveyors will assist in the development of gently dipping thick seams in the Pechora coal basin. Their production has been organized at the Svet Shakhtera Machine Building Plant in Kharkov. Yesterday the first such unit was shipped to miners at the Severnaya Mine. Working automatically with a combine and hydraulic roof supports it is capable of moving 7,000 tons of coal per shift, twice as much as its predecessors. Experimental models of the new coal carrier were tested thoroughly in the Pechora basin. Important changes were made in the design at the request of northern miners. This year Kharkov machine builders will ship the Vorkutaugol' Association another 12 such conveyors. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 26 Jan 83 p 2] 11574

NEW DRILL -- Skuratovskiy (Tula Oblast). At the assembly shop of the Skuratovskiy Experimental Plant, part of the Scientific Research Institute for Underground Machinery, testing is being completed on the UBG-IR unitized drill, which was built here. This unit was conceived as a unique robot capable of automatically drilling at high rates. The program given to it is recorded and stored in the "memory block" of an original electronic device. The operator carries out the first cycle of drilling. After this the lesson learned by the electronic "brain" can be repeatedly carried out at the tunneling face. The unit can perform a drilling cycle twice as fast as the series produced machines now used. [By N. Makharinets] [Text] [Moscow PRAVDA in Russian 18 Feb 83 p 2] 11574

MINE EXCEEDS PLAN-- Snezhnoye (Donetsk Oblast). The Musskaya Mine, which has won the Order of Lenin, is one of the best coal enterprises in the city of Snezhnoye. Day after day its miners are increasing the flow of coal extracted in excess of the plan. Since the beginning of the year consumers have been delivered eight full levels [eshelon] of anthracite above the plan. These successes have been attained through the effective use of mechanized complexes and other equipment, the introduction of progressive experience and systems of working thin coal seams, and the widespread development of competition for a communist attitude towards labor. The section led by A. Kononykhin was the victor in the competition. It already has two levels of above plan coal to its name. [By V. Vlasenko] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Feb 83 p 3] 11574

MINISTRY RESPONDS -- In the editorial "A Word to the Reader, published in this paper on 28 October 1982, one of the problems raised was that of poor spare parts supply to excavators of enterprises in the USSR Ministry of the Coal Industry. The article was discussed at the Ministry of Heavy and Transport Machine Building and, as Ye. Marmontov, production administration chief, reports, was considered to be accurate. Although last year spare parts deliveries increased by five percent compared to the year before, they are still not sufficient. Mintyazhmash's [Ministry of Heavy and Transport Machine Building] coefficient of machine tool use remains low, its increase is delayed by a shortage of machine tools. Therefore the production of spare parts for repair and operational needs is not growing at sufficient rates. Ye. Varnachev (Uralsmash PO [Production Association]) and Ye. Matsegor (Novo Kramatorskiy Machine Building Plant) were firmly pointed out the necessity of expanding the volume and assortment of excavator spare parts, and the more rational use of machine tools and their operators. Spare parts deliveries to USSR Minugleprom walking excavators has been put under Mintyazhmash's constant control [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Jan 83 p 2] 11574

DRILL UNIT -- The Kommunist Mine Equipment Plant in Krivoy Rog has begun series production of the NKR-100, a new drill unit. An important feature is that it can be driven electrically and pneumatically. It was developed by scientists workers and specialists of the Krivoy Rog basin. The general purpose unit will be used in the metallurgical, ore, and coal mining industries and in the construction of subways. [By L. Teushchakov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Feb 83 p 2] 11574

HIGH SPEED CUTTER -- The Yuzhnaya Mine in the Rostovugol' Association has completed testing of an experimental model high speed cutter, the daily output of which exceeds 1,000 tons. It has a strengthened conveyor and increased wear resistance. The new cutter was created by the collective of the Shakhy Machine Building Plant with the participation of specialists from the local scientific research institute for coal. A. Vakulenko's assembly brigade distinguished itself in the industrial introduction of the unit. The USSR Ministry of the Coal Industry has decided that this year the innovation will be displayed at the VDNKh SSSR [Exhibition of the Achievements of the National Economy of the USSR] [By N. Pozdnyakov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Feb 83 p 2] 11574

NEW SUPPORTS -- In the immediate future, according to Donetsk specialists, compressed air will become a reliable support in coal enterprises. Beginning their search in the laboratory, they moved to the Poltavskaya Mine and there, at great depths, they are testing their idea. Three 80 meter long cylindrical casings are arranged parallel along the face and air from pneumatic lines is pumped into them. "The experiment shows that the new supports open up the possibility of creating equipment to extract coal without the constant presence of people at the working face. CPSU 26th Congress decisions point to this." Stated Doctor of technical sciences G. Stepanovich, deputy director of the Donetsk Scientific Research Institute for Coal, where the machine was built. [By B. Gertsenov] [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 19 Jan 83 p 3] 11574

MINERS SUCCESSES -- Donetsk. Miners at the Donetskugol' Association have fulfilled their increased socialist obligations and have loaded 500,000 tons of coal in addition to the target. This was supported by the enterprises reconstruction and technical modernization. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 2 Dec 82 p 1] 11574

ROTOR ASSEMBLY -- Installation workers at the Ekibastuz Strip Mine Construction Administration of the Kazpromtekhmontazh have begun the assembly of the first 3,000 ton per hour rotary coal excavator. The unit will operate in the Vostochnyy Strip Mine. This type of machine, the capacity of which exceeds a large mine, and which has proven itself well, will become the leading type of coal extraction equipment here. Incidentally, the mine itself will go into operation by the end of the five-year plan and will produce 30 million tons of coal annually for power generation. Instead of taking the 18 months allotted by assembly norms, the Ekibastuz installers decided to put the unit together in 8-9 months, using consolidated assembly. The engineering preparations were carried out by the well known specialist and USSR State Prize winner, administration Chief Engineer A. Gusev. The assembly is by the brigades of V. Lebedev, N. Srybnyy, S. Khrapov, and V. Georgidze, following a unified work order. [By V. Stupak] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Jan 83 p 1] 11574

KARAGANDA COAL -- Each of the 4 sections at the Karagandinskaya Mine bring up more than 1,000 tons of coal a day. They have all overfulfilled plan targets. The collective headed by A. Zhakupov is leading in the socialist competition. During the current five-year plan this section has been annually extracting more than 500,000 tons of coal. The miners have again assumed high obligations of extracting this amount. During the year's first days they have held to an urgent pace and are confidently moving toward the intended goal. [By B. Glotov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Feb 83 p 1] 11574

VORKUTA MINERS -- The collective of the Vorgashorskaya Mine, the largest in the Pechora coal basin, is working with excellent rhythm. Since the beginning of the year the polar miners have extracted a million tons of coal, and since the beginning of the five-year plan they have piled up 1 million tons of fuel to their above plan figure. [Text] [Moscow PRAVDA in Russian 11 Mar 83 p 1] 11574

LONGWALL IMPROVES -- Rostov na Donu. The the working face brigade of Honored Miner N. Gubin at the Gukovskaya Mine at the Gukovugol' Association is producing 1,600 - 1,800 tons of coal daily. Here is the association's highest average monthly output per worker, more than 500 tons, while the plan is 417. The miners' longwall is generous, thanks to the precise organization of work, the proper operation of equipment and strict discipline. This year the brigade is among the initiators of the movement to increase coal extraction efficiency. [Text] [Moscow PRAVDA in Russian 25 Jan 83 p 1] 11574

NOVOKUZNETSK MINES -- The socialist obligations for the third year of the five-year plan assumed by miners at the Yuzhkuzbassugol' Association called for delivering the national economy 27,300,000 tons of coal. The preparatory section obligated itself to put 80 comprehensively mechanized work faces into operation, 4 more than last year. Since the beginning of the year miners collectives have produced more than 90,000 tons of coal above the plan. [By F.Demin] [Text] [Moscow IZVESTIYA in Russian 20 Feb 83 p 1] 11574

SCRAPER CONVEYORS -- The production of scraper conveyors has been organized at the Svet Shakhtera Machine Building Plant in Kharkov. The first such unit has been dispatched to miners at the Severnaya Mine. Working automatically with a combine and hydraulic roof supports it is capable of moving 7,000 tons of coal per shift. This year the Kharkov machine builders will send the Vorkuta-ugol' PO another 12 such machines. [Text] [Moscow IZVESTIYA in Russian 22 Jan 83 p 1] 11574

NEW MACHINES -- The new KMT complexes, the series production of which has begun at the Machine Building Plant imeni 50 Years of the Soviet Ukraine in Druzhkovka, will engage in the mechanized extraction of coal in gently dipping and sloping seams at depths up to 1,300 meters. Such equipment minimizes the labor and maximizes the safety of miners and great depth and in complex mining geological conditions. The Druzhkovka machine builders created the machine in cooperation with scientists from the Giprouglesh [State Institute for Coal Machinery Design] in Moscow, specialists at the Gorlovka Machine Building Plant imeni Kirov, and the Svet Shakhtera Plant in Kharkov. The first such KMT's were tested at the Mines imeni Volodarskiy in the Donbass and the Abashevskaya in the Kuzbass. The State Interdepartmental Commission recommended the complexes for series production. In 1983 miners will receive 10 of them. The operation of one of them will result in an annual savings to the national economy amounting to 600,000 rubles. [By Ye. Mzhen'] [Text] Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Jan 83 p 1] 11574

FUEL SAVINGS -- Ust'-Ilimsk. A document was signed stating the readiness of the 6th boiler unit of the Ust'-Ilimsk TETs for experimental operation. This event was waited for impatiently by power engineering workers, and specialists whose plans were used by the Barnaul Boiler Plant to build this unit with a capacity of 240 tons of steam per hour. Specialists have long been looking for a fundamentally new economical way to burn fuel. This problem has become especially important in connection with the creation of superpowerful boiler units at the Kansk-Achinks Fuel and Energy Complex. The new Ust'-Ilimsk boiler units could possibly become their prototypes. Associates at the Leningrad Polytechnical Institute proposed for it a new low temperature vortex furnace permitting the discontinuation of highly concentrated coal dust and using coal with particles up to 25 millimeters. The discontinuation of pulverized coal, which is used in ordinary design models, has reduced boiler unit production costs by 7 percent and made them operationally safe. [Text] [Moscow PRAVDA in Russian 21 Jan 83 p 2] 11574

CSO: 1822/185

## NON-NUCLEAR POWER

### MARYYSKAYA GRES CONNECTED TO INTEGRATED POWER SYSTEM

Baku VYSHKA in Russian 10 Nov 82 p 3

[Article by V. Ruzayev: "Electric Rivers Are Being Built"]

[Text] New electric rivers have begun running over the sand hills. A newly commissioned high-voltage electric transmission has connected the Maryyskaya GRES, where the sixth power unit has begun operation, with the integrated power system of Central Asia and Kazakhstan. Up to 10 million kWh of cheap electric power are being delivered daily along this giant bridge to our sister republics.

"Thus we repay our debt to the country," said S. Nuryyev, the director of the station. "Indeed, more than 80 plants from all the union republics participated in the construction of the first stage of the GRES. The turbines were delivered from the RSFRS, the transformers from the Ukraine and the instruments from Belorussia. Uzbekistan and Azerbaijan sent the best installation workers. The harmonious multinational builders collective reached maturity in its struggle with the difficulties, of which there were many. Suffice to say that the very station and the hundreds of kilometers of power lines were erected in temperatures that fell from +50° in the summer to -30° in the winter. One could follow the professional growth of the power engineers according to the schedule for turning the boiler units over for operation. It took approximately three years to build the first of them. The second was turned over in only six months. All the remaining units were placed into operation ahead of schedule."

The station has become a base for training highly qualified personnel for the republic's rapidly developing power industry. Specialists whom we had invited to help played a major role in the start-up of the first power unit, while today four-fifths of the personnel in the GRES collective are specialists who were trained at the station. The generation of electric power in Turkmenistan is slated to increase by a factor of 1.8 by the end of the five-year plan. The expansion of the MaryGRES, where construction is about to begin on the second stage, will help considerably in attaining this goal. This power giant, built in the desert, is surely gaining strength.

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CSO: 1822/169

## NON-NUCLEAR POWER

### SVOBODNYY-KHABAROVSK POWER LINE PLACED INTO OPERATION

Moscow STROITEL'NAYA GAZETA in Russian 1 Jan 83 p 2

[Article by G. Grishayeva: "The Line Is Laid"]

[Text] A segment of 500-kV power line from the city of Svobodnyy to Khabarovsk was placed into operation ahead of schedule. This is more than half the overall length of the line from the Zeyskaya GES to Khabarovsk.

Our contributing correspondent G. Grishayeva asked G. Cherkashin, the deputy chief of the USSR Glavvostokset'stroy, to comment upon this event.

"With the commissioning of this power line, the Khabarovsk Kray will receive an additional 100,000 kWh of power. Moreover, the reliability of the power supply will be increased, and the potential of the Zeyskiy hydraulic system will be more fully utilized.

The major participants in the construction are the trusts of Dal'elektroset'stroy, Krasnoyarskelektroset'stroy and the line units of Bratskgesstroy. Enterprises from cities and regions in the kray have also been enlisted in the construction of the power line. According to standards, the construction of the more than 600 km of power line would have required more than two years, yet the line was installed in one year.

The right-of-way intersected many rivers, including the Zeya and the Bureya, the Malyy Khingan Mountain Range and inaccessible swampland. The accelerated rate of construction was insured primarily through the mechanization of operations to a high degree.

The helicopters of the Far Eastern Civil Aviation Administration rendered the builders invaluable assistance. They were used at all stages of the construction--from the transporting of cargo and metal towers and their installation to the stringing and suspension of the conductors. Operations were made complicated in view of the fact that the expected freezing of the Bureya in November did not take place. The span over the river, incidentally, is 1,700 m.

The commissioning of the Svobodnyy-Khabarovsk power line marks the second stage in the integration of the power systems of the Far East."

## NON-NUCLEAR POWER

### CONSTRUCTION OF VAKHSH RIVER CASCADE DETAILED

Moscow STROITEL'NAYA GAZETA in Russian 21 Nov 82 p 4

[Article: "Cascade on the Vakhsh"]

[Text] The deputy chief engineer of the Tadzhikgidroenergostroy trust, Pavel Vasil'yevich Golubev, took the pointer in hand and walked up to the diagram which took up a good half of the wall. Thus began a unique trip along the famous cascade of electric power stations on the Vakhsh River.

"Nature in Tadzhikistan gave up only seven percent to the land. The mountains took the rest. There are numerous difficulties because of this, but, on the other hand, the potential with which this region has been invested is colossal. Take hydroelectric power, for example. Did you know that one kilometer of the Vakhsh is capable of providing almost twice as much electric power as one kilometer of the great Yenisey? After the Russian Federation, our republic occupies second place in the country with respect to hydroelectric resources.

It has not even been 30 years since we began to tame this comparatively small mountain river, and taming the river is precisely what we are doing. Indeed, in translation, the name "Vakhsh" means "wild," or "indomitable." At times its width does not even reach 10 m, yet its drop in elevation is almost 850 m. Construction in these regions is unusually complex. That is why we started on the river's downstream portion, accumulating experience, knowledge, technical skill and manpower. The first three stations--the Perepadnaya, Golovnaya and Tsentral'naya--were constructed in the mid-1950's and the beginning of the 1960's. Their total output is approximately 260,000 kW. The fourth station in the cascade was the Nurekskaya GES, however, and it alone has an output of 2.7 million kW. The year 1961 was a new benchmark for Tadzhik hydraulic power engineers. The Nurek became a genuine academy for them. It was here that the "Work-Relay" method was born. This method united the efforts of builders in the republic and of machine builders in Leningrad, the Ukraine and the Urals and other industrial centers throughout the country.

The Nurek served as a trampoline for the construction of an even more powerful station. Can you see here on the diagram a star alongside the place where two tributaries flow into the Vakhsh--the Surkhob and the Obikhingou? This is where the construction of the Rogunskaya GES began. It has six power units of 600,000-kW capacity each. What a station this is! In 1990, according to plan, the first power unit should begin providing current. The builders, however, have calculated

how to do this a year ahead of time. In the same way, they have calculated how to begin putting on the roof in 1985. You probably know that the Rogunskaya GES's dam exceeds the height of the dam at the Nurekskaya GES by several dozen meters and will be the highest dam in the world.

As construction winds down in Rogun, the erection of the Shurobskaya GES is beginning. In the last five-year plan, the start of construction at the Santudinskaya GES was scheduled. At the end of 1984, according to plan, provisions have been made to turn over the Baypazinskaya GES, now being built on the basis of the existing hydraulic system. The builders have displayed initiative and assumed an obligation to turn over the station by April 1984.

Thus, a cascade of eight hydroelectric stations should be operating on the Vakhsh by the mid-1990's. This, however, is not all. The designers are examining the feasibility of building nine more stations on the tributaries of the Vakhsh--the Surkhob and the Obikhingou. They have begun establishing the technical and economic foundations for yet another GES--the Dashtidzhunskaya GES. It will be on the Pyandzh River, adjacent to the Vakhsh.

Such are the reality and the prospects for the development of the hydroelectric power industry of the Yuzhno-Tadzhikskiy territorial production complex."

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CSO: 1822/169



## NON-NUCLEAR POWER

### BRIEFS

NEW POWER LINE--Omsk--Construction has been completed on a 371-km section of 500-kV power line between Ekibastuz and Omsk. It was erected parallel to an operating line along which electricity from the Yermakovskaya GRES in Pavlodar Oblast has been transmitted to Omsk Oblast for several years. The new high-capacity power bridge has been connected to the overall network and will soon accept its rated load. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Feb 83 p 1] 9512

POWER LINES IN AZERBAIJAN--A high-voltage electric power transmission line connecting Akhsu and Shemakha has begun operation. The set-up and installation of the equipment and the phasing of the republic's new power bridge was efficiently carried out by workers of the Ali-Bayramlinskaya power system. The collective has already commissioned two 110-kV overhead lines in the republic's Shirvanskaya region in recent years. This has made it possible to improve significantly the supply of electric power to agriculture in the Kyurdamirskiy Rayon. In the first days of January, the power-system workers connected two high-capacity power transformers at the Ali-Bayramly Home Appliance Plant and a new transformer substation in Ismailly into the republic's Unified Power System. Start-up and adjustment operations are nearing completion at yet another high-voltage substation, the Imishlinskaya station, which will be connected to the Ali-Bayramlinskaya GRES imeni Il'ich by a power line of 330-kV capacity. [Text] [Baku VYSHKA in Russian 25 Jan 83 p 1] 9512

POWER LINE UNDER LOAD--Kostomushka--A power line connecting this young city of Karelian miners with the Putkinskaya GES has been placed under load. This is the second power line laid to the Kostomushka iron-ore deposits. [Text] [Moscow PRAVDA in Russian 9 Feb 83 p 2] 9512

POWER LINES TO FARMS--Arkhangelsk--A new 217-km section of power line between Koryazhma and Mikun will make it possible to increase the reliability of power supply to many farms in the floodplains of the Vychgda and Severnaya Dvina rivers. This power line was put under industrial load a year ahead of schedule. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 15 Jan 83 p 1] 9512

LUMBER WASTES FOR POWER GENERATION--Ust-Ilimsk--The delivery of electric power and heat to the Ust-Ilimsk lumber complex from the neighboring TETs has been considerably reduced. Yesterday the fifth and last of the waste-heat boilers at the complex's heat plant was placed into full operation. Production wastes--bark, so-called "black liquor" and lignin--serve as raw material for the station. When the complex begins operating at full capacity, it will provide for two-thirds of its own heat and steam needs and one-third of its electric power requirements. [Text] [Moscow TRUD in Russian 6 Feb 83 p 1] 9512

POWER FOR CATTLE FARMS--Ust-Elegest--The Ust-Elegest-Khadyn power line will make it possible to provide reliable electric power to cattle farms and shepherds' stations in the Piy-Khemskiy Rayon. It has been placed under load. Over its almost 100-km length, the power bridge cuts across the taiga and many mountain slopes. The work team of I. Pereprygin from the Sel'elektrostroy trust of the Tuva Construction and Installation Administration installed the last section--across the Yenisey--ahead of schedule. Progressive methods of construction helped to achieve success, and, as a result, manual labor was held to a minimum. The collective of the construction and installation administration introduced the team-contract method in laying the power lines. This collective--an initiator of republic competition for the early commissioning of installations at the agro-industrial complex--have today taken on a commitment to increase the length of rural power lines by another 400 km and to provide electric power to 45 shepherds' stations. This is one-third more than called for in the plan. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Feb 83 p 1] 9512

NUREKSKAYA GES READIED--Operators at the Nurekskaya GES generated approximately 59 billion kWh of electric power, the production of which is proceeding at an accelerated pace. The Nurekgesstroy trust completed its annual plan for construction operations ahead of schedule. The workers in the trust have completed more than twice the required volume of work associated with the preparation of the Nurekskaya GES imeni L. I. Brezhnev for turn-over to the State Commission. [Text] [Baku VYSHKA in Russian 13 Jan 83 p 1] 9512

GUSINOOZERSKAYA GRES--The power industry of Buryatia is developing at a rapid rate. The commissioning of the 740,000-kW first stage of the Gusinoozerskaya GRES made it possible to increase the production of electric power in the republic by a factor of four in the years of the 10th Five-Year Plan. When the GRES is brought up to its full rated capacity--2.1 million kW--it will become one of the largest stations in the Far East. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 9, Feb 83 p 5] 9512

CSO: 1822/169

## PIPELINE CONSTRUCTION

UDC 621.643/553.002.2+62.001.7

### MINISTER RELATES MEASURES THAT ARE INCREASING PIPELINE CONSTRUCTION

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 12, Dec 82 pp 5-10

[Article by B. E. Shcherbina, minister of Construction of Petroleum and Gas Industry Enterprises: "Trunk Pipelines for Fuel-Generated Power"]

[Text] The 60th anniversary of the Union of Soviet Socialist Republics is a holiday of international unity, friendship and brotherhood of all Soviet peoples.

History knows of no state that has done so much in a short time for the overall development of nationalities and peoples.

As a result of the heroic labor of the Soviet people and the constant assistance of the Communist Party, a highly effective large-scale fuel-and-power complex has been created in the Soviet Union.

The builders of oil and gas industry enterprises celebrated the 60th anniversary of the forming of the Soviet Union with new achievements and by the execution of 26th CPSU Congress decisions.

The strenuous socialist commitments of the branch's collectives in honor of the glorious anniversary were fulfilled successfully.

In the first 10 months of 1982, 13,000 km of trunk pipeline and 51 pump and compressor stations were built. The total amount of contract construction and installing work was fulfilled 103.4 percent, and 990,000 m<sup>2</sup> of housing were put into use.

Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] collectives are now executing a grand pipeline building program. During the 11th Five-Year Plan the amount of work to be done will exceed that performed during the preceding 15 years. It is planned to lay 2-fold more 1420-mm diameter pipelines alone than during the 10th Five-Year Plan. In all, more than 62,000 km of trunk line made of pipe of various diameters, plus 100,000 km of pipe within the oil and gas fields themselves, are to be put into operation. The scale and pace during the 11th Five-Year Plan are such that, figuratively speaking, the builders will have to go around the earth at the equator more than twice in an extremely short time.

The most important segment of pipeline construction, where there is a shock-work front of the 11th Five-Year Plan, is erection of the superpipelines from Urengoy to the country's central regions. L. I. Brezhnev named the five huge West Siberian Central Economic Region gas pipelines and the Urengoy-Uzhgorod gas-export pipeline

as central construction projects of the five-year plan, which should be completed on time without fail.

The gas-pipeline system from Tyumen Oblast's northern areas to the European part of the country is being built on the lands of 17 oblasts and autonomous republics of the Russian Federation, the Ukraine and Belorussia.

The system's length exceeds 20,000 km, and its diameter is 1420 mm. The power-engineering potential of the stream of gas transported over one 1420-mm diameter pipeline at a pressure of 7.5 MPa is equivalent to the power of a 15,000-MW electric-power station. One thousand kilometers of such a pipeline means 1 million tons of metal, it means compressor stations on a par in power with the present-day Dneproges [Dneprovskaya GES], it means 50 million m<sup>3</sup> of ground dug up and backfilled or made suitable for recultivation, it means 1 billion rubles of capital investment. Gas pipelines of this class are complicated engineering structures.

The program for superpipeline construction is being accomplished successfully. Minneftegazstroy collectives, on adopting a counterplan, committed themselves to turning each gas pipeline over for operation 2-3 months ahead of the deadline.

For the first time in construction practice, the Urengoy-Ukhta-Gryazovets-Moscow gas pipeline was introduced at design capacity the year of startup. The Urengoy-Petrovsk gas pipeline is in operation. The erection of a third gas pipeline, the Urengoy-Novopskov, is being completed well ahead of the deadline.

The schedule on the gas-export pipeline is being bettered.

The 11th Five-Year Plan's central construction projects have no counterparts in world experience. For the first time in the world a multiple-strand system of transcontinental trunk gas pipelines is being erected in a so-called single operating corridor, and the task of bringing each gas pipeline up to design capacity in the year of startup has been set. Erection of the superpipelines in a single corridor will permit forces and resources to be concentrated in the main areas, better conditions for housing and domestic amenities to be created for the builders, the conduct of flow-type and phased operations to be introduced, more effective technology to be used, and losses caused by redeploying men and machinery to be precluded. One-fourth of the pipeline can be laid through the time saved on redeployments alone. A single operating corridor is also advantageous because it provides a mutual reserve of gas pipeline, the number of facilities for subsidiary-production purposes is cut, and installations for communications and for electrochemical protection of the arterials' segments from corrosion are combined.

But these do not by far exhaust the characteristics of the new multiple-strand system of superpipelines. Gas-pumping units of 16 and 25 MW power with full-head superchargers will be used at the compressor stations. Just one of these will reduce labor intensiveness of building the stations more than 2.5-fold and the requirement for fixtures, thick-walled pipe and joining parts 4-fold. The master plans for the compressor stations and the whole complex of facilities for subsidiary production purposes have been unified, enabling complete transfer to the progressive outfitted-module method of manufacture and erection of the operating equipment and to the erection of buildings made of lightweight structure that incorporates maximum preparation at the factory.

A prominent place has been given to automation, particularly to automation of control of the Urengoy gas complex and the pipeline-transport systems associated with it. The unit capacity of an installation for the integrated treatment of gas for pipeline transport will reach 20 billion m<sup>3</sup> per year.

Underground arteries of large-diameter clad pipe designed for a pressure of 10-12 MPa will be laid in a single gas-transport corridor. A qualitatively new construction organization and technology will be used for this. Specific capital and operating expenditures for long-distance gas transport will be greatly reduced. In other words, two trunk lines of the new class will replace the capacity of three Transeuropean underground trunk lines carrying fuel at a pressure of 7.5 MPa. An experimental segment made of 1420-mm diameter pipe designed for a pressure of 10-12 MPa has already been built in the North of Tyumen Oblast.

Erection of the new, mighty gas-transport systems was dictated by the need to solve such strategic tasks as development of the Soviet economy, intensive involvement of Siberia's riches in the economic turnover, substantial growth of the country's fuel and power potential, and a stable supply of gas for industrial enterprises and for the populace's household needs.

The recovery of gas and oil in West Siberia and the transport thereof to the European part of the country are to be made most important elements of the power-engineering program of the 11th and 12th Five-Year Plans. This is why the erection of the mighty power-engineering corridor--the superpipelines from West Siberia--is to cover the period up to 1990. As much gas will be transported through this corridor as was recovered at the end of the 10th Five-Year Plan. It is difficult to overestimate the economic effectiveness of the project being carried out, its influence on the gross national product, and its steadily increasing role in growth of national wealth.

The economic and political significance of the project, especially construction of the Urengoy-Pomary-Uzhgorod gas pipeline, will extend far beyond our country's borders.

The Urengoy-Pomary-Uzhgorod gas pipeline is unique in its technical and engineering parameters. It is 4,451 km long. Its route crosses 150 km of permafrost, more than 700 km of swamp, more than 2,000 km of forest, 545 mountains of the Urals and Carpathians and 26 large rivers. During the construction project, 129 million m<sup>3</sup> of soil should be worked over and 27.2 million m<sup>2</sup> of fertile land should be recultivated.

However, in scale of construction and installing work and in time spent executing it, the erection of the gas export pipeline is in no way a supertask for our country in terms of engineering and economics. The designed pace for the Urengoy-Pomary-Uzhgorod route is being surpassed. The basis for what has been achieved and for outstripping the plan increasingly is the great extent to which construction has been equipped with machinery. Soviet industry has created effective and reliable equipment for working with 1420-mm diameter pipe under the complicated conditions of the North.

The skills of the specialists and full mechanization are providing for steady growth in labor productivity. Not simply good workers are employed on the construction project but experienced masters of laying gas lines in the northern environment. Calculations indicate that no more than 20,000 persons are required for line work

on the gas pipeline route. The same number will be needed when operations reach full swing at all the compressor stations.

And yet, among the central projects of the 11th Five-Year Plan, the Urengoy-Pomary-Uzhgorod line is special in its significance to the country's economy and in its international implications. Bringing the gas-export pipeline up to designed capacity will complete enormous work on accelerated development of the gas industry and, perhaps, of its most basic stage. The country will become first in the world in the recovery of gas.

The Soviet people have been confident of the successful completion of construction of the gas-export pipeline. Their confidence rests upon the world's greatest experience in the erection of superlong gas pipelines, on our motherland's mighty industrial potential and on the patriotic initiative of the laboring collectives in providing for the timely introduction of the Urengoy-Pomary-Uzhgorod gas pipeline into operation.

Integrated competition on the Workers' Relay principle has been promoted among the laboring subcontracting collectives--the contracting trusts, the designers, the gas-recovery personnel, the metallurgists and the machinebuilders.

The machinebuilding ministries have planned to produce above plan in 1983 a large number of gas compressor units and to begin series output of gas turbines marked by 25 MW and full-head superchargers. Minaviaprom [Ministry of Aviation Industry] and Minkhimmash [Ministry of Chemical and Petroleum Machine Building] have developed and prepared for production gas-pumping units based upon 16-18 MW aviation engines. The measures taken not only will free our country at the end of the current five-year plan from the importation of such equipment but will also permit expenditures on the erection of compressor stations and the time taken to erect them to be greatly reduced. The laboring collectives of many of our country's enterprises and construction projects have taken new, increased commitments upon themselves. The CPSU Central Committee and USSR Council of Ministers, having approved the patriotic initiatives, confirmed in a special decree that gas both for internal requirements and for export will be provided by the established deadline. Considering themselves obligated to support this firm announcement with practical deeds, the builders decided to lay this year more than 2,000 km of gas pipeline and to put it into operation over the full distance ahead of time--in 1983.

An important means for realizing the program for accelerated erection of the super-pipelines is a large-scale experiment in organizing the construction of the gas export pipeline and of other trunk lines by subunits of a new type, which are specialized by stage of the production process: integrated flow-line operating groups and mobile mechanized columns for roadbuilding and transport operations and for preparatory engineering work. Programs for interregional manipulation of operating flow-line groups (in accordance with the example of V. Ya. Belyayev's collective, a number of flow-line groups were redeployed during the winter to northern sections of the route) are of great significance.

Experience in speedy construction and the potential that is now at the branch's disposal have created the prerequisites for enabling an additional, seventh super-pipeline above the plan to be laid during the current five-year plan. It is the duty of Minneftegazstroy collectives to resolve this important task successfully also.

The erection of the most huge gas-transport systems within short periods is possible only on the basis of wide use of scientific and technical achievements, improvement of the organizational structure and of management, and use of the diverse arsenal of experience that has been built up.

#### Relying Upon What Has Been Achieved

A high-capacity ramified pipeline network has now been created within the Soviet Union. Its length exceeds 220,000 km. The trunk pipelines that are included in the country's unified oil and gas supply system, like the blood-carrying arteries that permeate a living body, cover all the Union republics.

The Central Economic Region's underground arteries extend from Krasnodarskiy and Stavropolskiy Krays to Moscow, Leningrad and the Baltic republics. The Urals system, which passes through Karakalpakia and Kazakhstan, begin in the Bukhara-Khiva and Turkmen gas-bearing regions, and the Ural's industrial centers and those farther north receive streams of fuel from Tyumen Oblast. Also erected and in operation are the East Ukraine, Western, Volga, Caucasus and Transcaucasus, as well as the Central Asian, gas systems.

Pipeline transport and the oil and gas industries have become a mighty factor in the economic and cultural blossoming of the Union republics.

All this has helped to create unique pipelines of a new class--from pipe 1220-1420 mm in diameter and designed for a pressure of 6.4-7.5 MPa.

Comprising 13 percent of the total length of the USSR's gas pipeline system, the trunk lines of the new class support the transporting of 60 percent of the gas recovered. If this same transport task had been implemented through gas pipelines of lesser capacity (1220-mm diameter, 5.5 MPa of pressure), it would have been necessary to build twice as many of them. The higher technical level of the trunk pipelines and the rapid pace of construction have enabled centralization of the consumers' gas supply to be completed.

A new stage in the development of pipeline transport is connected with the construction of ethane, ethylene and ammonia and other trunk lines and with development of the hydraulic transport of coal, ore concentrates and other materials. The sphere of use of pipelines in the national economy is being greatly expanded.

The creation in the 1970's of a new transport branch and of pipelines of a new engineering class has become a decisive factor in increasing the resources of the fuel inventory, improving its structure, and rapidly involving West Siberian fields in the economy's turnover.

With reference to the tasks of erecting pipelines of a new class under diverse natural and climatic conditions, the organization of oil and gas facility construction was restructured with a view to increasing its national-economic effectiveness. An objectively determined trend toward unitizing complicated production processes and organizational structures was taken as the basis for formulating the technology and organization of oil and gas facility construction.

The scientific and technical research and the design developments that are being accomplished by Minneftegazstroy organizations are oriented to the creation of



progressive technology and to improvement of technical and production relationships, in accordance with the new social and economic terms for developing the oil and gas complex.

The results of the 10th Five-Year Plan indicate that the branch's science is becoming an increasingly tangible, direct production force. During 1976-1980, 168 designs of new, special construction machines and mechanisms were developed, and more than 100 models were recommended for series output. A special complex of machines was created for building pipelines 1220-1420 mm in diameter, including segments that are difficult of access and experience difficult natural and climatic conditions. Introduced on the routes were: highly productive earthmoving equipment, transport equipment of high off-the-road capability; and automatic welding of overhead joints by the resistance method, using flux-cored electrodes, and by the gas-arc method. The branch's equipment operating time has helped the power-worker ratio in construction on the line to be raised to 50 kW per person.

New methods and instruments for monitoring work quality and progressive insulating materials have found wide application, and the use of pipe with factory-applied insulation has started. The outfitted-module method, which provides for high effectiveness to the national economy, has been further developed for the construction of surface facilities.

The network of the branch's scientific-research and design-development organizations has been expanded. The creation of a laboratory base for production facilities and of a machinebuilding subbranch have great significance for shortening the "science-to-production" cycle.

Minneftegazstroy has become a large organization with a high scientific and technical potential, a developed network of structures and organizations, growing use of powered equipment, and an industrial base that is gaining strength.

The branch, which has been changed qualitatively since the date of its establishment, is now able to cope with a continuously increasing work volume. The construction and installing work volume that Minneftegazstroy carries out has risen from 2.3 billion rubles' worth in 1972 to 4.5 billion rubles' worth in 1982. The branch, it can be said, now has its own stamp. This consists primarily of the fact that, in organizing its work, the specifics and the special urgency of the task being resolved are considered.

#### The Policy of Intensification

The branch's chief mission during the 11th Five-Year Plan is to provide for the rise in the level of oil and gas recovery that is defined by "The Main Directions for the USSR's Economic and Social Development During 1981-1985 and During the Period up to 1990."

The "geography" of the construction projects for fuel and power engineering is being greatly expanded. New fields of Siberia, Uzbekistan, Turkmenia, Kazakhstan and Astrakhan are to be introduced into the economic turnover. Each of them will give our economy billions of cubic meters of natural gas, millions of tons of condensate and crude oil, and a large amount of other most important types of raw-material resources by the end of the five-year plan. Sixty-five new fields will be put into industrial operation for the gas industry alone.



The Karachaganak in the west of Kazakhstan is a shockwork construction project. This Union republic is also becoming the site of large new construction projects for the oil industry. These are sited at the Tengiz, Zhanazhol and other fields discovered in the Caspian depression and on the Buzachi Peninsula. It is planned to establish a new industrial center that is based upon the Astrakhan gas-condensate field.

Much work must be done to increase oil recovery in the Komi ASSR, Udmurtia, Tataria and Bashkiria. The builders should make their contribution to providing for the stable recovery of liquid fuel in Azerbaijan, the Ukraine, Turkmenia, Georgia, Belorussia and Uzbekistan. The oil and gas desposits of the continental shelf are to be mastered.

Much work is being done in West Siberia. The entire growth in gas recovery during the 11th Five-Year Plan is to be obtained precisely from this region, particularly from Urengoy and other fields of Tyumen Oblast's North. The share of Tyumen's North in nationwide gas recovery will increase from 36 percent in 1980 to 57 percent in 1985. The main raw-materials base for the rapid buildup of gas recovery will comprise the Urengoy and Yamburg fields and Yamal Peninsula deposits. This is why Minneftegazstroy collectives should intensify and speed up work at the Urengoy field and should begin to build up Yamburg's facilities.

Tyumen is the district at which the greatest amount of work should be done to support growth in oil recovery. It is planned to build up 39 new oilfields and put installations for the preparation of 150 million tons of crude oil into operation. This region's share in the nationwide recovery of oil, including gas condensate, will reach 63 percent, in comparison with 52 percent in 1980.

Major scientific and technical problems are being resolved by the specific-purpose program method. Consequently, measures specified by the specific-purpose programs for developing the West Siberian oil and gas complex and for creating 1420-mm diameter trunk pipelines and outfitted-module compressor stations for transporting gas from West Siberia to the country's central area are being implemented. In order to eliminate seasonality of construction in West Siberia and to increase the pace of building, and to raise the productivity and sophistication of labor, highly productive machinery and transport equipment that are adapted to the conditions of Tyumen's North are being created. The ETR-254 rotary excavator, with a productivity of 1,200 m<sup>3</sup>/hr, is intended for excavating ditches in frozen soils that will accommodate the full profile of 1420-mm diameter pipelines. An industrial check of the Sever-1 complex for resistance welding of 1420-mm diameter pipe on northern routes has been completed successfully. Various kinds of freight are being hauled over swampy sections by the swamp-traveling BTS-61 Tyumen, which has a load capacity of more than 30 tons.

An increase in the work pace and a rise in the quality of the erection of 1420-mm diameter gas pipelines on flooded lands requires that synchronism be provided in the operations of insulating, laying, ballasting and backfilling. Since ballasting volume is increasing continuously (because the amount of pipeline construction and the rigidity of design requirements are being increased), measures are being taken to increase the output of holddown weights. It is planned to organize the production of reinforced-concrete weights in the field, using casting-yard arrangements. A check of polymer container-type weights, which will enable local soil to be used, is under way. Recommendations for the large-scale use of anchors of more rational design will be issued.

Special equipment is necessary for summertime erection of pipelines on swampy lands. For this purpose it has been decided to convert to the output of swamp-traveling vehicles of increased reliability, to organize the production of trailers for them, for hauling hold-down weights, and to manufacture high load capacity flatbeds, based on the air-cushion. It is planned to develop cranes of 25-tons' load capacity, refueling vehicles and pipe carriers based upon swamp-traveling vehicles. Work is being done to create a special heavy swamp-traveling pipelayer. The output of laboratories with high off-the-road capability for monitoring the quality of welded joints and of two-set welding installations based upon tractors equipped with semiswamp-traveling tracks, will be organized.

Problems of laying high-capacity gas pipelines in single corridors, creating gas pipelines of a new class, erecting pipelines in permafrost and swamps, using clad-type pipe and pipe of other design, preparing high-viscosity crude oil for transport, cooling gas, and protecting trunk lines from corrosion require that basic science become involved. The AN SSSR [USSR Academy of Sciences] and its Siberian Department, the USSR GNTK [State Committee for Science and Technology] and the UkSSR AN [Academy of Sciences], with which Minneftegazstroy is developing fruitful, creative ties, are taking part in solving these scientific and technical problems. Joint plans that are defined by the ministry's board and the Presidium of the Ukraine's Academy of Sciences are being implemented. The scientific potential of vuzes is also being used. Expansion of this creative collaboration will help basic science to permeate a most important sector of the economy, which oil and gas facility construction is, and will enable its scientific and technical level and production effectiveness to be raised.

The ministry is implementing "The Integrated Science-and-Production Program for Raising the Quality of Construction and the Reliability of Trunk Pipelines," which includes measures for improving the quality-control system in accordance with the structure of pipeline construction, which has been restructured, increasing the capacity of the monitoring services, expanding their supply and equipment base and automating monitoring processes. The use of more trustworthy methods for nondestructive monitoring of weld-joint quality, effective ballasting resources, and new constructional solutions, with compensation for longitudinal deformations and with cooling of the product being transported, is called for.

The CPSU Central Committee decree, "On the Work of the Ministry of Construction of Petroleum and Gas Industry Enterprises to Reequip Construction Operations and to Introduce Progressive Methods for Them," is a long-term program for further increasing the scientific and technical level of oil and gas construction, for substantially improving work effectiveness and quality and for introducing progressive methods for organizing and managing construction operations. After evaluating highly the branch's achievements, the CPSU Central Committee obligated the ministry's board and all collectives to speed up conversion to more intensive methods of management and to strive to achieve consistent increases in labor productivity growth, to raise capital investment effectiveness and the quality of the facilities being erected, to implement the strictest savings regime, to indoctrinate personnel in the spirit of innovation, on the basis of new equipment and improvement in work organization, and to provide for fulfillment and overfulfillment of plan tasks for 1982 and for the five-year plan as a whole.

Pipeline construction effectiveness will be increased through the wide introduction of automatic welding (its share in 1985 will reach 70 percent of welding operations overall), the use of pipe with factory-applied insulation (this is one of the most

important areas of industrializing and of raising the quality of construction), and the use of more productive earthmoving equipment and of transport with high off-the-road capability. Improvement in ballasting pipelines in swamps and flooded lands and thorough and timely engineering preparation of the route and of the sites for industrial-type facilities are of great importance. A unified engineering policy that is implemented by the ministry in the area of raising the level of the industrialization of construction of surface structures is founded on the expansion and further improvement of the outfitted-module method. Facilities with a total cost of 1 billion rubles--600 million rubles' worth in West Siberia--will be built by this method.

Realization of the planned measures will enable the pace of work on building the line itself to be doubled by 1985; the productivity per flow-line group building 1220-1420 mm diameter trunk lines to be increased to 100 km in 1982; the productivity of flow-line groups building pipelines of other diameters to be increased 1.5-fold to 1.7-fold; and the effectiveness of the work on laying pipelines within the petroleum fields to be raised. The pace of construction of compressor and pump stations and of petroleum-field facilities will increase 1.5-fold.

Much has been done in the branch in recent years to cut the time required for erecting compressor stations. The capacity of the KS's [compressor stations] introduced has doubled. However, the construction of some compressor stations is lagging behind the deadlines. Such lags must be eliminated. This is all the more important when it is considered that the ministry's subunits are converting to the construction of KS's with gas-pumping units of 16 and 25 MW capacity.

An important direction for increasing the work effectiveness of Minneftegazstroy organizations and enterprises is the conversion thereof completely to new management methods. The branch is implementing a specific-purpose program for improving the management mechanism.

In accordance with the master scheme for the branch's management, main administrations and associations have been specialized on the type, regional and branch principles, with the creation of new subunits of middle-element management.

Trusts are the basic management element. They are specialized by type of construction and are responsible for fulfilling the whole complex of operations contemplated by the plan and for turning over production capacity and facilities for operation by the established deadlines. Such guidance for trusts meets modern management requirements in the greatest degree.

The tasks of expanding cost-accounting relationships in the middle-management element and of converting West Siberian main-production administrations to full cost accounting are being faced. The development and improvement of cost accounting in lower-level elements, based upon the principles of the brigade contract for construction on the line, should be oriented to the flow-line group contract for the integrated flow-line operating groups that are working under single agreements, with payment for the final results.

With the increase and qualitative change in the construction-equipment pool (increase in the number of higher-capacity machines, and a rise in the share of power-intensive machinery and of northern versions of machines) that are being experienced during planning, consideration of the mechanization-worker ratio should be replaced by the concept of the ratio of power per worker engaged in production. The country

has equipped the ministry's organizations with high-powered modern machinery, and it is our concern that it be used to the maximum and effectively. Questions of the preservation and of repair support for machinery and mechanisms are acquiring special significance. The assembly-and-component method of repair and centralized technical services based upon individual-service principles will be further developed. An improvement in the use and repair support for the machinery will enable plans for the mechanization of work to be carried out and for return on capital to be increased.

The conversion to an evaluation of results in accordance with commodity output, and then to net output, changes essentially the emphasis in capital-construction management and requires of all personnel a specific orientation to the timely introduction of facilities and to effective methods of management.

One of the important areas for improving management activity is the saving of various materials, including raw materials and fuel and power resources. There are still many unused possibilities in this area.

Much energy and labor are being invested in fulfilling the branch's social-development program. During the 11th Five-Year Plan the task of stable support for oil and gas facility construction by skilled personnel, based upon improvement of all aspects of livelihood and more complete satisfaction of the workers' material and inner-life requirements, should be solved. In this connection, the timely introduction into operation of housing and of facilities for social, cultural and domestic-amenity purposes are of urgent importance. Effective measures are needed so that various organizations that have reduced the construction pace for schools, children's institutions and housing will correct the situation that has been created.

The branch's program for social development calls for further improvement of the training and instruction of personnel. Augmentation of the construction-equipment pool with new machinery requires new operating solutions, and, the main thing, improvement in organizing the training of erectors and builders. Primarily highly skilled workers are required for serving the new class of welding equipment, industrial robots and manipulators, and machinery and mechanisms of increased complexity.

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## PIPELINE CONSTRUCTION

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### PIPELINE CONSTRUCTION TO CEMA COUNTRIES AND INTERNATIONAL CONSTRUCTION DEALS

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 12, Dec 82 pp 32-34

[Article by D. S. Marinin: "At All Latitudes"]

[Text] Our country's foreign economic ties in the area of erecting oil and gas industry facilities already has a history of more than 20 years. Economic collaboration with socialist and developing and industrially developed capitalist countries is an important factor in increasing the effectiveness of the country's social production and in strengthening friendly ties with other states.

The expansion and deepening of economic relations with the socialist countries is being organized in every possible way on the basis of full equality of the rights of the countries, respect for national sovereignty, mutual advantage and comradely mutual assistance in building up their economies.

Positive experience in economic, scientific and technical collaboration with socialist countries in the area of pipeline construction was gained while erecting the Druzhba oil-pipeline system, the Bratstvo and Soyuz gas-pipeline systems and pipelines for various purposes in the CSSR [Czechoslovak Socialist Republic], the BNR [People's Republic of Bulgaria], the RSR [Socialist Republic of Romania], the MNK [Hungarian People's Republic] and the SRV [Socialist Republic of Vietnam]. Technical assistance has been rendered to the GDR in the development of gas fields and to the MNR [Mongolian People's Republic] in the construction of bulk plants.

In December 1959 intergovernmental agreements were concluded about construction of the firstling of socialist integration--the Druzhba Transeuropean oil pipeline. These agreements, which bore a trilateral nature (among the USSR, GDR and PRL [People's Republic of Poland], and among the USSR, MNK and CSSR), defined the mutual obligations of the countries participating in the construction. The GDR, Czechoslovakia and Poland undertook to deliver pipe. The production of pump units was organized in the GDR. Hungary provided the project with automation equipment. Production enterprises of the USSR, on whose lands the largest portions of the oil pipeline were located, supplied the major portion of the pipe and equipment.

The erection of this system resolved the greatest transport problem connected with a continuous supply of raw-material crude oil and created a firm basis for the intensive development of oil-refining and petrochemical industries in the Hungarian People's Republic, the German Democratic Republic, the Polish People's Republic and the Czechoslovak Socialist Republic.

This system had no counterparts in world practice, either in total length or the size of the flow of crude oil.

The Druzhba oil pipeline should have gone into operation at the start of 1964. However, in October 1961 the last joint on the Soviet-Czechoslovak border was welded, and Soviet crude arrived at the Slovnaft Oil Refinery in Bratislava on 22 February 1962. In September 1962 the Czechoslovak-Hungarian section went into operation. Deliveries of crude to Poland started in November 1963, and in December the GDR section began operation.

In 1972 construction of a second strand of the Druzhba oil pipeline was completed, enabling the pipeline's productivity to be more than doubled. The network of oil pipelines in the socialist countries was expanded. The Druzhba oil pipeline was connected to the Soviet Union's unified oil-pipeline system. Now oil enters the international arterial not just from the Kuybyshev region. A pipeline from Tataria leads to the terminal segment of the oil pipeline, and crude from Tyumen Oblast also arrives in the system.

A base for mixing the crude has been created at the terminal section of the Druzhba international oil pipeline. This specially built structure was erected at the sources of the three rivers over which fuel is sent to Lisichansk, Tikhoretsk and the country's western regions. Crude oil that arrives from fields of the Volga region, Nizhnevartovsk and Mangyshlak are not homogeneous--they have different contents of sulfur, paraffin and so on. The customers need raw material of definite parameters. Because of this, mixing centers are necessary. The annual economic benefit is 30 million rubles. Expenditures for building this base were recouped in a year.

In October 1980 builders of the Energopol' Association, from the Polish People's Republic, started up the last pump station on the Druzhba oil pipeline at the Mazheykayay Oil Refinery. In 5 years the envoys of the neighboring socialist country had laid 440 km of pipeline to the petrochemical giant of Soviet Lithuania.

The construction of the Bratstvo gas pipeline, which joins the Carpathians with Slovakia's industrial centers, became an important landmark in the history of economic collaboration.

The erection of the USSR-MNK trunk pipeline system was a bright example of socialist economic integration. In addition to erection of the linear portion and the compressor stations, which operate on the basis of Soviet gas-pumping units, taps totaling more than 100 km in length were built, and the total length of the gas pipelines was about 1,000 km.

In order to transport Soviet natural gas to the Hungarian People's Republic, Soviet construction workers erected an underwater gas pipeline on USSR land and on the Hungarian section of the gas pipeline. The first phase of this route was turned over by the 11th VSRP [Hungarian Socialist Workers Party] Congress, the second phase by the 25th CPSU Congress.

In meeting the desires of the European socialist countries, the Soviet Union made a proposal to erect, by the joint efforts of CEMA member countries, a trunk gas pipeline from the third phase of the Orenburg gas field to the USSR's western border. In 1974 a general agreement was signed among the chiefs of government of the BNR, MNK, GDR, PRL, RSR, USSR and CSSR. The system of pipeline arterials was 2,750 km long and was made of 1420-mm diameter pipe. Compressor stations, a control system,

including remote control, repair and restoration service centers, and facilities for housing and for cultural and domestic-amenity purposes were built.

For the first time in CEMA practice, such a large facility was erected on USSR land with the direct participation of the collaborating socialist countries. The construction route was divided into a number of segments, which were assigned to the countries participating in the construction project--Bulgaria, Hungary, the GDR, Poland, the USSR and Czechoslovakia--on the basis of the proportional distribution of capital investment. The Socialist Republic of Romania took part in supplying operating equipment for the Orenburg gas-treatment plant, which is a component part of the gas-transport system.

Soviet construction organizations which have much experience in erecting such systems extended comprehensive assistance to their colleagues, who were working on such a large production-operations task for the first time.

The international construction project acquired everything that was new and advanced that had been accumulated in domestic and world pipeline construction practice.

Construction of the gas pipeline arterial, which was named Soyuz, reached its broadest scope in 1977. By that time, more than 15,000 construction workers from Bulgaria, Hungary, the GDR, Poland, the Soviet Union and Czechoslovakia were working at the international construction project. Erection of the gas-pipeline facilities was constantly the center of attention of the communist and workers' parties of the countries participating in the construction, and also of the party committees and trade-union and Komsomol organs of the oblasts and republics over whose territory the route passed. The Komsomol Central Committee and the Union of Youth Organizations of these countries adopted sponsorship over the international construction project.

The last joint--the "red joint"--of the new gas-transport arterial was welded on 27 September 1978 at the border of the USSR and the CSSR, close to Uzhgorod. The Soyuz gas pipeline arterial, the largest in Europe, had been put into operation.

The chemical, metallurgical, ceramics and glass branches of industry are being developed at an accelerated pace in the socialist countries, based upon the use of Soviet natural gas. Technology and working conditions were improved, and the purity of the air basin was improved. Natural gas is used widely in machinebuilding, the processing and food industries, agriculture, the municipal and domestic-affairs sectors, and other branches of the national economy.

Today the Soviet Union sends natural gas to 12 European countries.

Based on an agreement to send Soviet natural gas to Finland, Minneftegazstroy built the Leningrad-Vyborg-Gosgranitsa [State Border] gas pipeline on USSR territory and gas pipelines on Finnish territory. Since December 1973 Soviet natural gas has been arriving continuously at our northern neighbor's industrial enterprises.

In 1978 construction was started on a new, large gas pipeline, Konsortsium, which is intended for transporting Soviet natural gas to West European countries. Since January 1981, billions of cubic meters of gas have been sent annually over this line. Erection of a third strand of the Transeuropean gas arterial on Czechoslovak is being completed, with the introduction of which the throughput of this system of pipelines will be increased still more..



An example of the collaboration of CEMA member countries is the bilateral agreement to build petrochemical and gas-industry facilities on USSR territory. A number of facilities have been built in our country by representatives of the Energopol' Association from the Polish People's Republic. These include primarily four pump stations on the Druzhba oil-pipeline system and the Polotsk-Birshay-Mazheykyay oil pipeline, with four pump stations and a tank farm. Polish builders worked well on erection of the Adreapol'-Polotsk oil pipeline and on the compressor stations of the Petrovsk-Novopskov and Shebelinka-Ostrogozhsk gas pipelines.

A number of facilities have been built on the lands of the socialist countries, based upon bilateral-agreement principles. Soviet builders have erected a trunk gas pipeline and petroleum-product pipeline in Hungary. Collaboration with other socialist countries is also being developed effectively.

From year to year the foreign-economic activity of Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] organizations is being expanded. Developing countries of Asia and Africa are entering the sphere of collaboration, along with socialist and developed capitalist countries.

In extending assistance to the developing states, the ministry's construction organizations are erecting trunk oil and gas pipeline systems and oil pumping and compressor stations, and they are working to build up the fields.

In Iran the northern section of the Transiranian trunk gas pipeline, eight compressor stations and a number of other facilities were erected under contract.

With the active participation of Minneftegazstroy, a foundation was laid for developing the key branch of Iraq' state sector--the oil-recovery industry.

Among the most important facilities of Soviet-Iraqi collaboration, the first national oilfield, North Rumaylah, should be noted. The introduction of this oilfield into operation, simultaneously with the buildup of the North Rumaylah-Port Fao crude-oil pipeline, expanded the potential for exporting oil directly from Iraqi ports through the Persian Gulf.

The Baghdad-Basra petroleum-product pipeline, which is about 600 km long, was also built in Iraq. With the startup of this petroleum-product pipeline, which, in its technical level, is one of the leading pipelines of the world, it became possible to pump three types of petroleum product (kerosene, gasoline and gas oil) in two directions among the oil refineries. After 12 months of guaranteed servicing by Soviet specialists, this petroleum-product pipeline was transferred in October 1978 to the Iraqi Republic for subsequent operation.

The North Rumaylah-Nasiriyah gas pipeline, an industrial complex for pumping water to the North Rumaylah field, and the New Karkh bulk plant, with a large tank farm, are of great importance for developing Iraq's industry.

Minneftegazstroy's ties with the Democratic Republic of Afghanistan are being expanded. Much has been done by Soviet specialists to master the fields of Khoja-Gugerdar, Jarkuduk, Khoja-Bulan and Yetym-Tar, which are parts of the Shibarghan group. The first field of the Khoja-Gugerdar was put into operation in October 1967. A gas pipeline 820 mm in diameter and about 100 km long was laid for the delivery of Afghan gas to the USSR, and an overhead crossing of the gas pipeline across the Amu-Dar'ya was erected under a contract.



In 1977-1979 a second Jarkuduk field was built up. It is included in the Shibarghan group. An aggressive-component content (hydrogen sulfide and carbonic acid) is characteristic of the gas at this field. Some complicated scrubbing structures were built at the field. The gas is gathered by underground field grids over a distance of more than 140 km at the field's head structures. It is subjected to integrated treatment and then goes to the terminal structures of the Khoja-Gurda field, where it is combined with the gas stream from that field.

With the introduction into operation of the Jarkuduk complex, gas recovery in Afghanistan has doubled. The complex engineering structures of Jarkuduk are a bright symbol of proletarian internationalism in action, living testimony of the fraternal relations between the peoples of Afghanistan and the Soviet Union. During the building of the Jarkuduk field alone, about 250 Afghan workers were taught various trades, and the Afghan personnel who were to operate the field gained on-the-job experience.

Soviet construction workers are now working successfully on the erection of other important fuel and power facilities for friendly Afghanistan.

Minneftegazstroy is doing large amounts of work on the African continent. In Nigeria, two systems of petroleum-product pipelines that total 904 km in length, five pump stations and four centers for receiving and metering petroleum product were erected in Nigeria under complicated natural and climatic conditions. Nigerian, British and Italian firms participated in this work, along with Soviet organizations.

The Soviet Union is successfully carrying out its contract commitments in Libya on construction of the 570-km Mars el Brega-Misratah gas pipeline. A number of large crude-oil and gas facilities are being erected in Angola, Libya, Ethiopia and other countries with Minneftegazstroy participation. Our country is entering into the widest businesslike collaboration on a long-term and mutually advantageous basis with all countries of the world, regardless of their social order.

Today the whole world's attention is riveted on how matters are going with erection of the Urengoy-Pomary-Uzhgorod gas-export pipeline. The interest on this route is special, and it is being heated up by the policy of the United States's administration.

In October 1982, 1,000 km of the total pipeline length of 4,500 km had already been welded into pipeline strand. The daily pace of the trunk line has reached 15-16 km. Next year 17 compressor stations will be introduced on the export route. Preparatory and basic work will go on full blast here, and its pace will increase each day.

But meanwhile, this gas export pipeline is just one of six technically similar pipelines that are being erected in our country during the current five-year plan. The USSR is the only country where such facilities are being built. The United States spent a whole decade building the Transalaskan gas pipeline, which is comparable in technical parameters with the Soviets' gas pipelines, while our country is introducing one such facility each year. To master such majestic amounts of construction is within the powers only of a country with a powerful, developed economy. Only a state rich in energy resources can allocate 1 trillion m<sup>3</sup> of gas for export for a quarter of a century.

Construction of the Urengoy gas pipeline with the use of commercial credits on a compensational basis will enable budgetary resources to be used to carry out other national-economy programs and will promote the creation of an appropriate infrastructure in West Siberia in a shorter time. Simultaneously, while gas is being exported, the gas supply of the central areas of the European part of the USSR will be improved. And the currency reserve created from the gas sales will be used to buy goods necessary for carrying out other national economic programs.

Experience in erection of the Soyuz gas pipeline has proved to be of great assistance to the builders of the new trunk lines. The wide participation of CEMA member countries in erection of the largest gas arterials has become a nice tradition. At the appeal of the Union of Free German Youth, hundreds of young specialists from various districts of the GDR will work during this five-year plan on construction of the Urengoy-Central Economic Region gas-pipeline system, and also on one of the sections of the Urengoy-Pomary-Uzhgorod gas-export arterial. The GDR builders are to lay more than 500 km of large-diameter pipeline and erect 7 compressor stations on various routes. The first group of construction workers from the fraternal republic are already working successfully on the export arterial route.

Czechoslovak specialists have arrived at their own grounds to build a new strand of the through gas pipeline, which will provide a route for gas from West Siberia to Western Europe. In January 1988 this strand will operate at full capacity, but, even before its introduction, Czechoslovakia will provide for the passage of all gas supplied by the Soviets, shipments of which, as is known, will begin in 1984.

The existence of a broad program for speeded-up and effective development of our country's fuel and power complex and broad help in this area to CEMA member countries within the framework of socialist integration, as well as to other countries, on the basis of mutual advantage, will enable the fuel and power resources to be used for the benefit of progress and peace in the whole world.

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## PIPELINE CONSTRUCTION

.UDC 621.643:621.791/62.001.7

### RECENT SCIENTIFIC, TECHNICAL INNOVATIONS IN PIPELINE BUILDING TOLD

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 12, Dec 82 pp 19-23

[Article by B. Ye. Paton, president of the UkSSR Academy of Sciences and Academician: "The Solution to Problems of Scientific and Technical Progress in Pipeline Construction"]

[Text] The exceptionally important and ever-increasing role of oil and gas in our country's fuel and power complex and in strengthening the USSR's position in the world market requires an unswerving increase in the pipeline construction pace. This, in turn, requires the integrated solution of a number of complicated scientific, technical and production questions. The complexity of these tasks and the responsibility for the correctness of their solutions increase with the shift of oil and gas recovery to regions with severe climates that are remote from the consumers.

Scientists of the Ukrainian SSR Academy of Sciences are making a meaningful contribution to solving problems of raising the technical level of the construction of trunk oil and gas pipelines and of providing for the reliability of their operation. Working in close contact with production workers, our scientists have effected a number of developments that have found wide application directly in the practice of erecting and operating high-capacity trunk pipelines.

The Institute of Electrical Welding imeni Ye. O. Paton of the UkSSR Academy of Sciences has created designs, jointly with a number of enterprises and organizations of Minchermet [Ministry of Ferrous Metallurgy], Mingazprom [Ministry of Gas Industry] and Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises], for clad pipe for gas pipelines. No one has any doubt that only pipe of a basically new design that has been clad is capable of resisting extensive cumulative ionization breakdown.

With the creation of 1420-mm diameter gas pipelines of increased unit productivity and a working pressure of 10-12 MPa, the various indicators of such systems must be better than those of gas pipelines with a working pressure of 7.5 MPa. It is desirable that the cost of their manufacture and erection, which is related to the unit of weight of the pipeline, not be allowed to increase. In this case, a reduction in the number of strands erected in a corridor because of a rise in their productivity will enable prime operating costs for transporting gas and work volume to be reduced.

Attempts of leading foreign firms to create high-strength pipe for trunk pipelines that is based upon ferritic-pearlitic niobium steels of the Kh65, Kh70 and Kh75 classes are encountering great difficulties. With the conversion to bainite-type steel, alloying with nickel, molybdenum and niobium and improvement of the technology for rolling niobium-containing steels on improved mills are required.

With the creation of thick-walled structure, especially of structure that operates under pressure, the principle of replacing the solid-wall with a compound article was realized long ago.

It was just such a principle that our scientists incorporated in the design of pipe made of clad shell.

Such pipe precludes the possibility of brittle destruction or ductile rupture of a gas pipeline of great length by the use of coiled low-alloy hot-rolled domestic steel 4-6 mm thick, which is much cheaper than thick-walled steel of the same strength, plasticity and resistance to cold.

The cost of this pipe with increased wall thickness is not raised. The manufacture of a test lot of pipe made of clad shell for pressures of 7.5 and 10 MPa, hydraulic and pneumatic tests of individual pipes and of welded pipelengths to failure, and the construction of test segments of gas pipelines made of clad pipe have enabled the specifications for the pipe to be made more precise and their industrial production to be created at the Vyksa Metallurgical Plant.

Work is being done to create straight-weld and spiral-weld gas pipeline pipe made of steel of a new class, which has been named sheathed quasimonolithic (AKM) steel. This steel is obtained by rolling an ingot sheathed with a steel sleeve of special design, as if dividing this ingot into separate compartments parallel to its wide edges. A sheet of layered construction is obtained with a special set of properties that lends the sheet to separation cutting, bending, molding and other technological processes. The sheathed quasimonolithic metal is not distinguishable from monolithic in strength indicators but exceeds it greatly in resistance to cumulative ionization formation. Under dynamic or vibration loading, especially at low temperatures, pipe made of AKM steel, like pipe made from clad steel, possess the ability to withstand the development of cracks during hydraulic and pneumatic tests to failure.

Designs for so-called quasiclad (KSM) pipe have been created, which is obtained by hot rolling. It is distinguished by an absence of longitudinal welds and a high degree of reliability. Having a clad-like structure, these pipes possess superior operating characteristics, primarily the capability to suppress cracks.

All three new designs of gas-pipeline pipe combine a similarity of physico-mechanical properties and the use of simple, inexpensive steels that do not contain scarce alloying elements.

The efficiency and reliability of pipelines are determined greatly by a labor-intensive but essential operation--welding.

Until recently, all overhead joints were welded by means of manual electric-arc welding. Reserves for raising labor productivity with this welding method had to a great extent been exhausted, and stability of the quality of the welded joints depended essentially upon the skills of the welders and upon the weather.

The Institute of Electrical Welding imeni Ye. O. Paton of the UkSSR AN [Academy of Sciences] has created, jointly with the KF of the SKB [Special Design Bureau] of Gazstroy Mashina, VNIIST [All-Union Scientific-Research Institute for Trunk Pipeline Construction] and Minneftegazstroy, the technology and an array of machines for the resistance welding, under field conditions, of joints of pipe 114 to 1420 mm in diameter. New principles for regulating and programming the flashing processes, in combination with original design solutions for assemblies of the welding-circuit bus and of the machines' drive, are used.

The serially produced K-584 machine is designed for welding pipe 114-325 mm in diameter with 18-mm thick walls in the field under fixed conditions. It is made in the form of tongs, which are hung on the boom of the pipelayer or other transport. The machine's productivity under production conditions is 15-20 joints per hour.

The K-700 machine was designed for welding pipe 1420-mm in diameter. During welding, the machine is inside the pipeline strand being welded, moving along it by means of an autonomous drive. This configuration has enabled the machine's weight to be greatly reduced and the problem of moving it rapidly from joint to joint to be solved. Welding a joint of 1420-mm diameter pipe takes 3-3.5 minutes.

The Sever complex, which includes, along with the welding machine and mobile power plant, devices for cleaning the ends of the pipe and for removing external fins, is serviced by a brigade of 11-12 people. In the Far North environment this complex enables six joints to be welded per hour, with a maximum hourly productivity of 7-8 joints. The results of Sever-complex operation testifies to the high and stable quality of the welded junctions. Serial output of these units is being mastered this year.

While it is more desirable to use the complexes for the resistance welding of pipelines when constructing segments of pipelines of great length with a relatively small number of crossings and turns, where the locality is frequently intersected, it is more desirable to use highly mobile installations for mechanized arc welding of the overhead joints of trunk pipelines, using flux-cored electrodes with positive joint shaping. The creation of this technology and the equipment for it was new in world practice in the area of improving pipewelding. Unlike electric-arc welding with free joint forming, welding with positive forming is distinguished advantageously by high productivity. The use of self-protecting flux-coring as filler material provides a zone for welding the operationally necessary layer of slag, makes the use of other special protective means unnecessary, and provides for stable quality of the welded junctions. The possibility of wide variations in alloying of the wire's core enables pipe made of steel of various chemical compositions to be welded. Experience in use of the new technology, based upon serially produced Styk complexes for pipe 1220 and 1420 mm in diameter, showed that it enters well into any organization of the work and provides for stable quality with good economic indicators. Use of the Styk complex has enabled output per welder to be increased 1.7-fold when welding 1420-mm diameter pipe.

The development of a technology and the equipment for positive joint-forming welding of overhead joints in pipe 325 to 1020 mm in diameter with wall thickness of up to 30 mm, which is applicable to the erection of pipelines at pump, compressor, thermal and nuclear-power stations, is being completed successfully. In the process of an experimental-production check on the technology of the Styk equipment complex, welding work was done on a pipeline 1020 mm in diameter for a compressor

station in the Tyumen region and on a 720-mm diameter pipeline of a thermal electric-power station near Moscow. Serial output of Styk-2 complexes is planned.

The creation of highly effective methods for monitoring pipe-welding quality during pipe production and directly at the construction site is of great importance in solving the problems of insuring pipeline reliability.

During the production of welded pipe, various physical methods of defectoscopy are combined in order to increase the trustworthiness of nondestructive testing. At the Khartsyzsk Pipe Plant, a system of monitoring that includes X-ray television and ultrasonic monitoring (UZK) is functioning successfully.

Highly productive automated installations for nondestructive inspection--the U-664, for example--has been developed by the Institute of Electrical Welding imeni Ye. O. Paton, jointly with the Volna Science and Production Association. Domestic X-ray television systems of the Luch-3 type, which are being used at pipe plants, detect gas and slag inclusions, incomplete penetration and cracks with a rather high speed. Similar installations with X-ray electronic-optical converters of the Arbalet type, which enable monitoring sensitivity to be increased, have passed their tests.

During the construction of trunk pipelines, the traditional methods for nondestructive testing are radiographic, which permit photos of the weld to be obtained on X-ray film. Studies made by the Institute for Electrical Welding and other scientific centers of the country have showed that in some cases it is possible to use, instead of X-ray film, other detectors, in which the silver content is 15-fold to 20-fold less.

The main directions for developing methods and means for nondestructive monitoring during the production of large-diameter pipe are the use of computers for processing and visualizing the results, the inclusion of monitoring systems in the technological line for the production of pipe, and the creation of complicated monitoring systems, which include, along with UZK and the radiographic method, methods of acoustic emissions and magnetic monitoring means, which enable the informativeness of the defectoscopy to be increased.

Among the main tasks when creating low-temperature trunk pipelines are those of choosing material and evaluating the pipeline's strength and taking the constructional-technology and operational factors into account. The solution of these tasks is possible only with the use of modern highly productive automatic measuring equipment and means for monitoring and processing the experimental data.

The Institute of Strength Problems of the UkSSR AN is creating the Magistral', a measurement and computations system that is intended for work on an experimental pipeline segment in the Ukhta region. The Magistral' system is being constructed on the basis of the modern Elektronika-60 microcomputer. Use of the microcomputer enables flexible reprogramable automatic control of the measuring process and a procedure for interrogating the sensors to be provided for, correction of some systematic measurement errors to be made, and machine processing of experimental data with presentation of the results in a form convenient for further use to be executed. The Magistral'-module construction of the system will enable the customer to change the system's configuration relative to an experiment. The broad functional possibilities will enable programs to be replaced easily without change of the technical means and to be easily restructured for various experimental research methodologies. Thanks to the use of special circuits for cutting in the sensors

and of various methods for optimal filtration of the measuring signal, the length of the measuring routes can reach 1 km.

Work is being done to evaluate the influence of constructional-technology factors on the carrying capability of trunk-pipeline elements at low temperatures under a static load. A new method for raising the reliability and the carrying capability of trunk pipelines by winding on the pipe a strengthening shape of large section--strapping--is being developed experimentally. It will enable the production of new pipe to be arranged in the shortest possible time without drastic restructuring of the pipe industry, using traditional equipment.

The Institute of Mechanics and the Institute of Electrical Welding imeni Ye. O. Paton of the UkSSR AN are studying, jointly with Minneftegazstroy organizations, the stress-deformation state of pipelines, and designs for suppressors of cumulative-ionization breakdown are being developed. The fulfillment of this work is an important step on the road to scientifically substantiated design and development of a technology for creating reliably operating high-pressure trunk pipelines.

The stress-deformation state of welded clad pipe under internal-pressure loadings has been studied, as has the local stability of clad pipe and of cumulative-ionization suppressors under axial compression and external pressure. Assessments of the critical stresses of axial (and longitudinal) compression and of the critical external pressure as a function of the design of the clad shell have been obtained.

An approximation method for computing the stress-deformation state of self-compensated pipe has been developed, and, on that basis, studies have been made of the longitudinal rigidity and the stress status of these pipes under "hot" pipeline operating conditions. Designs for bellows compensators 700 mm in diameter have been developed.

Work is being done on validation of the service life of pipelines and recommendations on raising their reliability and efficiency are in the preparatory stage.

The Petrochemical Department of InFOU of UkSSR AN is resolving problems of protecting pipelines against corrosion. Jointly with the Institute of Electrical Welding Ye. O. Paton and Minneftegazstroy and Minneftekhimmash [Ministry of Chemical and Petroleum Machinebuilding] organizations, a basically new single-stage technology for manufacturing two-layer heat-setting tape--one of the best materials for protecting pipelines from corrosion--has been developed. The tape will be manufactured from domestic raw materials by the method of coextrusion and photochemical joining. This technology is simpler and more economical than that used abroad.

UkrNIIplastmash [Ukrainian Scientific-Research Institute for Plastic-Manufacturing Machinebuilding] has fabricated an experimental test line for obtaining the heat-setting tape with an annual productivity of 200-250 tons. A decision for startup at the beginning of 1983 of experimental industrial production of the tape at the Novokuybyshev Insulation-Materials Plant has been adopted. One thousand tons of the tape will be produced per year.

A formula and the technology for obtaining two-layer insulating tape with photochemical joining of a thermostabilized polyethylene base and a butyl-rubber based adhesive are being developed. Such tape will be applied to a pipe that is cleaned and primed. It possesses high adhesion at room and higher temperatures (60 degrees C) and great shearing forces. Thanks to the joined upper layer, it is



stable against cracking under stress and has high cold resistance. A base composition for the adhesive has now been created, and the basic possibility of obtaining the tape by the coextrusion method has been demonstrated.

Industrial tests having been conducted, the method of flame-free strengthening of cathode-drainage leads for electrochemical protection against corrosion for gas pipelines under pressure is being transferred to Minneftegazstroy.

In collaboration with VNIIGaz [All-Union Scientific-Research Institute for Natural Gas], inhibitors of hydrogen-sulfide corrosion of pipelines and equipment at gas-field facilities are being developed. An effective corrosion inhibitor, Gazokhim-1, which provides for the protection of steel from hydrogen sulfide, has been developed on the basis of the still bottoms of hexamethylenedioxine production. Research continues on the development of new corrosion inhibitors that are based upon accessible petroleum industry products.

The Institute of Cybernetics imeni V. M. Glushkov of the UkSSR AN, in collaboration with a number of Minneftgazstroy organizations, has conducted research and has developed a set of mathematical and programing means that will enable choice of an optimal longitudinal profile for trunk pipelines to be made (in accordance with the criteria of a minimum of total expenditures for construction), more rational ballasting of the lines with weights and anchors, and optimization of the distribution of labor and material expenditures by period of pipeline construction.

The research and the developments of scientists and specialists of the Academy of Sciences of the Soviet Ukraine are making a meaningful contribution to solution of the problems of scientific and technical progress in the area of developing pipeline transport, and many of them have received deserved recognition abroad.

Thus, for example, American specialists, in speaking about the undisputed leadership of the Soviet Union in the technology of automatic pipewelding and of the construction of large-diameter pipelines under complicated natural and climatic conditions, note that Soviet technology is impressive and clearly surpasses all equipment of a similar type on the international market.

Soviet pipewelding machines have been acquired under license by firms of many countries, including the United States and Japan.

The new design of clad pipe for high-pressure pipelines is recognized by American specialists as unique.

The successfulness of our developments has been occasioned to a great extent by a combining of the efforts of scientists and engineers of academic and of the branch's institutes and organizations. Such close collaboration is directing scientists toward solution of most urgent tasks and is supporting the accelerated use of the newest scientific and technical achievements in practice.

The preparation of joint integrated programs is a progressive form for organizing collaboration. It is just such a program, which is aimed at solving problems of scientific and technical progress in pipeline transport, that was recently approved by a decree of the Presidium of the UkSSR Academy of Sciences and the Minneftegazstroy Board. Its realization undoubtedly will serve toward the successful development of the country's fuel and power complex.

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## PIPELINE CONSTRUCTION

UDC 621.643.002(204.1)

### TECHNIQUES FOR LAYING 1420-MM DIAMETER PIPELINES UNDER WATER DESCRIBED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 12, Dec 82 pp 24-25

[Article by P. P. Basharat'yan of Soyuzpodvodtruboprovodstroy [All-Union Trust for Underwater Pipeline Construction]: "Underwater 1420-mm Diameter Gas Pipelines"]

[Text] Work volume on the erection of underwater pipelines during the 11th Five-Year Plan will double that of the preceding five-year plan. In so doing, the amount of construction and installing work for the West Siberian region alone will exceed the total amount of underwater-engineering work carried out during the entire preceding five-year plan as a whole. Each year no less than three strands will be laid at each river in the single corridor of the West Siberia-Central Economic Region gas pipeline, whereas the existing construction pace is one strand per year.

During the 10th Five-Year Plan underwater crossings by gas pipelines 1220-mm in diameter were introduced widely. However, the rising pace and scale of the construction of trunk gas pipelines has required an increase in the diameter of the underwater crossings being erected.

Soyuzpodvodtruboprovodstroy, in close collaboration with VNIIST [All-Union Scientific Research Institute for Pipeline Construction], the SKB [Special Design Bureau] of Gazstroy Mashina, the EKB [Experimental Design Bureau] for Reinforced Concrete and other ministry organizations are working to create an industrialized technology and a set of machinery, mechanisms and equipment, as well as special designs, for ballasting weights for underwater-crossing construction.

The erection of underwater crossings for pipelines 1420 mm in diameter will enable the hydraulic effectiveness of the gas pipelines to be raised, conditions for scrubbing their insides during operations to be improved, the number of reserve strands to be reduced, and the chambers for the reception and launch of cleaning devices whose cost in some cases exceeds that of the underwater crossing itself, to be dispensed with. In building a single-strand crossing 1420 mm in diameter across the River Nadya for the Urengoy-Novopskov gas pipeline, 2,500 tons of pipe and 2,400 cast-iron weights were saved. The amount of soil excavated from underwater ditches here was reduced by 1 million m<sup>3</sup>. Work is being done to replace the cast-iron weights by weights made of materials that are less scarce, primarily reinforced concrete.

The weight of an equipped pipeline 1420 mm in diameter is 1.5-fold to 2-fold that of 1220-mm diameter pipeline. Therefore in order to lay such gas pipelines under

water in accordance with existing technology, the fleet of heavy pipelayers must be increased 3-fold, the load-lifting capability of the unloading pontoons almost 2-fold.

OSD-3 launching tracks for executing this operation are unsuitable. Therefore, designs for launching arrangements for erecting and laying the pipelines must be created in a short time. The elastic-bending radius and the rigidity of the underwater crossings, which lead to an increase in the amount of underwater earthmoving work and the estimated number of weights, are rising. The design institutes must pay attention to the fact that the bores of underwater crossings 1420 mm in diameter should be chosen to take into account an absence of rocky soils, minimal plane and deep deformations of the riverbed, and smooth relief of the locality.

One of the most labor-intensive operations during the laying of 1420-mm diameter pipeline by the drag-through method will be the operation of lateral movement of the ballasted welded pipelengths into the bore of the crossing, for later addition to the strand, since the weight of one welded pipelength 200 meters long is 600-700 tons. Therefore, when erecting such crossings, the technology proposed by VNIIST, which calls for the separate flow-line group method of erecting welded pipelengths in the crossing's bore, should be used more widely. In so doing, the process of erecting the underwater crossing, excluding the earthmoving work, becomes continuous. The work of erecting and welding the pipe is done on the launching way and is combined with the drag-through process. This method is especially effective when erecting pipelines made of factory-readied members--individual concreted pipes. It requires abolition of preliminary hydraulic testing of the welded pipelength, and it precludes the necessity for the delivery of special pipe.

The method of laying pipeline by means of TGT-20 type heavyweight haulers with a load capacity of 20 tons has been substantiated. A technology that calls for the use of TG-60 heavyweight haulers, with a load capacity of 60 tons, has been developed.

By means of these devices, it is possible to move welded pipelengths up to 200 meters long laterally in the bore of the crossing, to join them with pipeline that has been laid and to drag them across the water obstacle. This greatly reduces the use of heavy pipelayers.

The use of easily assembled holddown weights, on the creation of which the EKB for Reinforced Concrete is working jointly with VNIIST and Soyuzpodvodtruboprovodstroy, is opening up great prospects. Their introduction will enable the processes of ballasting and drag-through of the pipelines to be combined.

Special attention should be paid to the construction of crossings 1420 mm in diameter across small water bodies less than 75 meters wide. At present such crossings are, as a rule, designed to be under water. In many cases it is more desirable economically to erect them above the water. The association has undertaken organizational and equipmental preparation for building such crossings.

Reinforced-concrete holddown weights of the UKT type, 1420 mm in diameter, which were designed by the EKB for Reinforced Concrete, were used for the first time in construction practice during the erection of an underwater crossing for the Urengoy-Novopskov gas pipeline across a small river. The pipe was laid by the consecutive addition of ballasted welded pipelengths, each 130 meters long, using an LP-151 traction winch, 8 heavy pipelayers and a bulldozer.

During the erection of another underwater crossing by Specialized Administration No 2 of Vostokpodvodtruboprovodstroy [Underwater Pipeline Construction Trust for the Eastern Economic Region], pipe 1420 mm in diameter that was concreted under field conditions was laid. The work was done on one of the largest crossings of the Urengoy-Novopskov gas pipeline.

More than 20 underwater crossings will be built and about 40 strands of underwater pipeline 1420 mm in diameter will be laid during construction of the Urengoy-Uzhgorod and Urengoy-Yelets gas-pipeline system. This will enable construction time to be reduced and will yield an economic benefit of about 14 million rubles.

Soyuzpodvodtruboprovodstroy is successfully executing a set of measures to improve the technology and to raise the pace and quality of underwater-crossing construction.

Highly productive technical means and technology for building pipelines across water obstacles are being created. These will enable underwater crossings for pipe 1420 mm in diameter to be erected in short periods on the routes of the most important gas pipelines.

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## PIPELINE CONSTRUCTION

### SELECTED SYNOPSSES OF ARTICLES IN 'PIPELINE CONSTRUCTION', DECEMBER 1982

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 12, Dec 82 p 48

UDC 31(100):620.92

#### THE COUNTRY'S FUEL INDUSTRY ON THE 60TH ANNIVERSARY OF THE SOVIET STATE

[Synopsis of article by N. K. Baybakov, from STROITEL'STVO TRUBOPROVODOV, No 12, 1982 pp 2-4]

[Text] Light is thrown on the main stages in the development of fuel-generated power over the 60-year period. The main characteristics of a new strategy for further developing and improving the country's fuel and power balance are examined. Much attention is paid to work done by Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] to build up the capacity of the oil and gas industries. The important role of the specialized branch for construction in solving the tasks of increasing the recovery of gas and oil in West Siberia and of the transporting thereof to the European part of the country are shown.

UDC 621.643/553.002.2+61.001.7

#### TRUNK PIPELINES FOR FUEL-GENERATED POWER

[Synopsis of article by B. Ye. Shcherbina, STROITEL'STVO TRUBOPROVODOV No 12, 1982 pp 5-10]

[Text] The achievements of the branch's construction workers in celebration of the 60th anniversary of the forming of the USSR are noted. Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] tasks of carrying out the pipeline construction program, which calls for the erection during the 11th Five-Year Plan of a system of trunk pipelines from West Siberia, and especially of the gas export pipeline, are defined. The main stages of oil and gas industry construction and the growth of its scientific and supply-and-equipment base, which will enable the branch to resort to the main trunk lines for fuel-generated power, are elucidated. Measures that the ministry has taken to realize the program of intensification and to raise the effectiveness of the construction of facilities for the oil and gas industry are examined.

UDC 621.643/553.002.2(574)

#### NEW GOALS FOR KAZAKHSTAN'S OIL AND GAS COMPLEX

[Synopsis of article by O. S. Miroshkhin, from STROITEL'STVO TRUBOPROVODOV No 12, 1982 pp 11-13]

[Text] Kazakhstan's contribution to development of the unified national-economic complex of the multinationality Soviet state is examined. The role of

Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] subunits, particularly Mangyshlakneftegazstroy [Mangyshlak Trust for the Construction of Oil and Gas Industry Enterprises], in the buildup of the Uzen, Zhetybay, Kalamkas and Karazhanbas fields and in the construction of oil and gas trunk lines, production bases, settlements for rotating-duty workers and other facilities is indicated. Special attention is paid to the role of party and economic organs in energizing the work of carrying out the majestic program for developing the country's fuel and power complex. 2 illustrations.

(UDC 621.643/553.002.2(575.1)

#### INTEGRATED MASTERY OF UZBEKISTAN'S GAS RESOURCES

[Synopsis of article by N. D. Khudayberdyev, from STROITEL'STVO TRUBOPROVODOV No 12, 1982 pp 13-16]

[Text] The importance is shown of Uzbekistan's land, water, mineral raw-material and labor resources, as well as the high-capacity production potential, for the comprehensive development of the republic's economy and for increasing the republic's contribution to the solution of nationwide tasks that has been created in the years of socialist competition. Special attention is paid to development of the republic's gas industry. The contribution of the Kazakh people and the workers of other fraternal Union republics to the creation of the capacity of the Gazli field, the Mubarek Gas-Treatment Complex and other facilities for fuel-generated power is noted. 2 illustration.

UDC 553.002.2(470.41)

#### ON THE ROAD TO THE THIRD BILLION

[Synopsis of article by G. I. Usmanov, from STROITEL'STVO TRUBOPROVODOV No 12, 1982 pp 16-18]

[Text] It is emphasized that the republic's natural resources that have been put to the service of socialism have enabled the Tatarskaya ASSR to occupy a meritorious place among the various regions for recovering and refining crude oil. The contribution of scientists, specialists and workers to the improvement of methods for developing, mastering and building up Tataria's oilfields is indicated. Much attention is paid to the work of Tatneftestroy [Tatar Association for the Construction of Oil Industry Facilities], which is carrying out the main amounts of construction and installing work during the erection of enterprises of the republic's fuel-generated power. 2 illustrations.

UDC 621.643:621.791/62.001.7

#### SOLUTION OF PROBLEMS OF SCIENTIFIC AND TECHNICAL PROGRESS IN PIPELINE CONSTRUCTION

[Synopsis of article by B. Ye. Paton, from STROITEL'STVO TRUBOPROVODOV No 12, 1982 pp 19-23]

[Text] The meaningful contribution of UkSSR scientists and engineers in solving the problems of raising the technical level of the construction and operation of trunk oil and gas pipelines is noted. An important place is attached to developments in creating basically new designs for pipe for trunk gas pipelines of increased unit productivity, a family of special machines for the resistance welding of joints and for electric-arc welding with fluxed-core electrodes, with positive forming of the weld, and methods for nondestructive monitoring of weld junctions. An approximation method for computing the stress deformation status of pipe, a technology for manufacturing two-layer heat-setting tape for insulating pipelines

and a number of other engineering solutions that are finding wide application on Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] jobs are described. Measures for promoting the collaboration of UkSSR Academy of Sciences institutes with Minneftegazstroy enterprises and organizations are determined.

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## GENERAL

### PROGRESS AT EKIBASTUZ POWER PROJECT SURVEYED

Alma-Ata PARTIYNAYA ZHIZN' KAZAKHSTANA in Russian No 11, 1982 pp 31-36

[Article by P. Yepilov, first secretary, Pavlodar Obkom, Kazakhstan CP:  
"Ekibastuz Today and Tomorrow"]

[Excerpts] Workers in the Pavlodar area along the Irtysh River, just like all the Soviet people, are preparing to worthily celebrate the 60th Anniversary of the formation of the USSR, and are engaged in creative activities. Their efforts are directed towards fulfilling the 26th CPSU Congress decisions, in which the party's internal and external policies found a deep, scientific foundation, and which determine the path to the further strengthening of our Motherland, and the steady increase in the Soviet people's welfare and cultural levels. There is an expansion in purposeful work in the realization of the USSR Food Program, developed on the initiative of comrade L. I. Brezhnev and approved by the CPSU Central Committee May (1982) Plenum.

Under contemporary conditions, when complex, large scale socioeconomic tasks are being handled, and a sharp transformation is under way towards intensive methods of economic activity in order to achieve rapid growth in the efficiency of all social production, one of the basic conditions for ensuring high rates of economic growth is the pace setting development of the fuel and energy base. In the Report to the 26th Congress, General Secretary L. I. Brezhnev stressed: "The unconditional prerequisite for the solution of all national economic, production and social problems is the development of heavy industry. This especially applies to its basic sectors, and first of all to fuel and energy."

In due time electric power stations burning coal extracted by open pit methods will account for a large share of power production.

The Pavlodar-Ekibastuz economic region has a special role in this regard. The oblast has very rich fuel-energy, mineral, raw material, and water resources. It is also distinguished by an advantageous geographic and transportation situation. The coal reserves concentrated in the Ekibastuz and Maykubenskoye deposits are calculated to be almost 14 billion tons.

The beginnings of the formation of the complex were outlined by 25th CPSU Congress decisions. In March 1977 the CPSU Central Committee and the USSR Council of Ministers adopted the decree: "On the Creation of the Ekibastuz Fuel-Energy Complex and the Construction of the Ekibastuz-Center 1500 Kilovolt Electric Transmission Line."

The "Basic Directions for the Economic and Social Development of the USSR for 1981-1985 and for the Period up to 1990" stress: "Thermal electric power stations, using coal from the Ekibastuz and Kansk-Achinsk basins are to be built at accelerated rates, ...the first section of the Ekibastuz - Center 1500 kv DC line and the Ekibastuz 1150 kv AC line should be put into operation first." Work on the Ekibastuz Fuel and Energy Complex, abbreviated EFEC, is under way at full speed. Its construction is complicated and prolonged, not done in a year, or even a five-year plan. The EFEC is taking shape on the basis of progressive scientific-technical methods which use highly productive mining and transport equipment for extracting coal and flow line and high speed methods for building large capacity electric power stations. On what is the complex based and how will it look? At its basis is one of the richest coal deposits, located in the Ekibastuz region. It has been decided to burn this in powerful electric stations and transmit the electrical energy to the nation's central regions and the Urals. This is the main idea behind EFEC. It is assumed that the total production of coal will reach 120 million tons, and electrical energy 108 billion kilowatt hours.

The EFEC has no analogue in power engineering construction with respect to huge size of its installations, the level of technical solutions, and its economic effect. The creation of such a unique complex required the organization of design and construction, and the production of new equipment for environmental protection, all conducted to the very highest standards, and using the latest science and technology. In addition to the solution of purely economic and technical problems, serious attention is also given to the program's social aspects, which are at least as complex and large.

The basis of the complex consists of open cut mines producing from 20 to 50 million tons of coal annually, and 4 million kW thermal electric power stations with 500,000 kv unit capacity energy blocks.

The CPSU Central Committee and USSR Council of Ministers Decree: "On Additional Measures for Accelerating Coal Extraction by the Open Cut Method During 1981-1990" defines a program for the comprehensive development of the coal part of the Ekibastuz project. Extraction strips will be reequipped, by 1986 the first section of the new Vostochnyy [East] coal seam will be opened, it will be equipped with conveyors, the most economical method for open cut extraction. Its planned capacity is 30 million tons annually. By 1985 Ekibastuz miners will be providing the nation with 84 million tons of coal.

EFEC is the heart of the Pavlodar-Ekibastuz economic region. It is essential to note that its creation is having a substantial influence in advancing the oblast's entire economy. A large petrochemical complex using West Siberian petroleum is being built in Pavlodar, where the first section of a modern petroleum refinery is already in operation. A metallurgical complex is gathering strength. Its major elements are the Yermak Ferroalloy Plant imeni 23rd CPSU Congress, the Pavlodar Aluminum Plant imeni 50th Year of the USSR, and the Pavlodar Tractor Plant imeni V. I. Lenin Production Association. The Boshchekul'skiy mining and concentration combine is under construction.

Coal is energy and the region's present and future. More than 20 large electric power stations in Kazakhstan, Siberia and the Urals are now operating on coal



from Ekibastuz. The furnaces of electric stations now being built will receive large amounts of the coal being extracted. About 100 billion kwh of the electrical energy being produced will go to the needs of our republic's industry and agriculture. This, in its turn, will assist in the construction of new and the expansion of existing enterprises' production capacity. In addition to increases in coal extraction and the construction of thermal electric power stations, it is intended to further increase the production of alumina, ferroalloys, complete most of the reconstruction work on the Pavlodar Tractor Plant, and introduce the second section of the petroleum refinery. This will make possible about a 1.5 fold increase in industrial production volume and at least a 28 percent rise in labor productivity during the 11th Five-Year Plan.

In spite of the fact that the complex has only begun its biography, much has been done. The nation has already received more than 700 million tons of coal from the seams, the Ekibastuz GRES-1 has produced its first energy, and a program is under way to create bases for the construction industry, house and social, cultural, service project construction. Speaking of the 10th Five-Year Plan's results, comrade L. I. Brezhnev noted in his report to the 26th Congress: "In 1980 miners at the Pavlodar-Ekibastuz complex extracted about 68 million tons of coal, almost 3 fold more than in 1970." The Bogatyr' strip reached full planned capacity of 50 million tons annually. Powerful rotary bucket excavators, with a capacity of 5,000 tons per hour are working here. This operation has now completely paid off initial costs and has achieved the highest labor productivity in the sector.

Four energy blocks with a capacity of 500,000 kw each have gone into operation at the Ekibastuz GRES-1. They have already produced about 12 billion kwh of electrical energy.

There have been five years of intensive work in the implementation of the CPSU Central Committee and USSR Council of Ministers Decree: "On the Creation of the Ekibastuz Feul-Energy Complex and the construction of the Bekibastuz-Center 1500 Kilovolt Electric Transmission Line." In his report to the 15th Congress of Kazakhstan's communists, D. A. Kunayev, CPSU Central Committee Politburo member and first secretary of the Kazakhstan CP Central Committee, stressed: "By the end of the five-year plan it will be necessary to ensure the extensive development of the Pavlodar-Ekibastuz complex..., it is essential to introduce the full capacity of Ekibastuz GRES-1 and the first blocks of GRES-2." Implementing these directives, oblast administrations, associations, enterprises, and organizations have done much in the past year and a half to complete complex projects. There has been a considerable increase in the volume and pace of construction work, construction sites have been selected and land parcels allocated, a general plan and layout for the city of miners and power producers has been approved, and scientific research is being conducted on problems of environmental protection in the EFEC zone.

Quite a bit has been and is being done, nevertheless, the work pace still does not meet the requirements for accelerated construction and introduction of projects in the complex. During these years they have not succeeded in completing

everything intended by the measures and decisions of ministries participating in the EFEC's creation. For example, there is still serious concern about the installation of the coal enterprises. As is known, it was intended to create several giant open cut coal mines at the Ekibastuz coal field. The construction of one of them, the Vostochnyy, is lagging behind plan deadlines. The USSR Ministry of the Coal Industry has not solved the problems of delivering mining and transport equipment, and its construction is not supported by the necessary planning and estimation documentation. During 1978-1982 only 11 percent of the projects's estimated total cost had been utilized.

The Kazakh SSR Ministry of Power and Electrification and the USSR Ministry of the Coal Industry have been confirmed as general contractors [zastroyshchik] for the city. The Ekibastuzenergostroy Trust is building the city and energy projects in the complex, and the Ekibastuzshakhtostroy [Ekibastuz Mining Construction] Combine is building the coal sections. It is obvious that these ministries should take the most energetic measures to accelerate design and construction work on cultural-service, municipal, and sports projects.

Coal miners, power engineering workers, builders, and transportation workers have other problems. For example, because of the lack of reliable repair facilities, the requirements for equipment repair are only half filled. At the same time the USSR Ministry of Power and Electrification is not fulfilling plans for the reconstruction of a mine transportation equipment plant. There are large shortcomings in transportation service for the complex. The Ministry of the Coal Industry has still not begun the construction of a 250 vehicle facility for the Ekibastuzgol' [Ekibastuz Coal] Association.

The problem of getting workers to construction sites has now become very acute. GRES-1 is 15 kilometers, and GRES-2 40 kilometers from the city of Ekibastuz. All transportation is by motor vehicle, while the ministries of transport construction, railways and power and electrification are slowly handling the problems of railroad transportation.

An operational solution to these and other problems by the appropriate and ministries and departments would help considerably in completing the party and the government's tasks involving the introduction of capacity at EFEC enterprises and projects.

Big construction projects have big problems. In handling them, the party obkom and gorkom above all keep general state interests in the forefront, they are striving for close linkages between all production operations, and comprehensively using the region's potentials in order to solve problems posed by the 26th CPSU Congress, and the 15th Kazakhstan CP Congress.

Communists and workers in the Pavlodar-Ekibastuz production-territorial complex, celebrating the 65th Anniversary of the Great October Revolution, and the 60th Anniversary of the USSR's formation, are full of resolution to fulfill and overfulfill plan targets and their socialist obligations.

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